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WESTERN PIPE AND STEEL NEWS

RELOCATION OF SPRING VALLEY PIPE LINE ALONG NEW BAY SHORE HIGHWAY.—*This picture, looking north from fill near Sierra Point, shows six bends in the new pipe line fabricated by Western Pipe and Steel Co.*

1924-1931 vol 1-5

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI JANUARY, 1929 NUMBER 1

Spring Valley Water Co. Moves 44" Pipe Line for San Francisco's New Bay Shore Highway

By T. W. Espy, Assistant Chief Engineer
Spring Valley Water Company

THREE and one-half miles of the Bay Shore Highway, from the city limits of San Francisco to South San Francisco, s now being constructed as a highway reloca-ion project by the California State Highway Commission. The rugged topography of the north end of the San Francisco Peninsula has always interfered with an easy solution of ransportation facilities between San Fran-isco and its hinterland to the south, but this reconstruction program settles the problem for all time.

T. W. Espy

Three main highways connecting with the communities in San Mateo County and fur-her south are being developed as steps in a solution of San Francisco's difficult problem of ingress and egress.

One of these highways follows through the Western portion of San Francisco in a south-erly direction along or near the shore of the Pacific Ocean, thence along the top of the highest ridge of the range of mountains between the Pacific Ocean and San Francisco Bay. This highway, called the "Skyline Boulevard," has been in use for several years and now extends for a distance of 40 miles to the south of San Francisco.

A second main highway outlet follows the old "San Jose-San Francisco road," which has been the main thoroughfare between the two cities since the time of the old Spanish Missions, and is romantically known as "El Camino Real." From the center of San Francisco this San Jose-San Fran-cisco road runs in a southerly direction midway between the Pacific Ocean on the west and San Francisco Bay on the east. It has long since been completed as a wide paved highway through San Mateo County and beyond, but only recently has the portion at the city limits of San Francisco been widened and made into a first-class boulevard.

The third main road to the south leaves the eastern part of San Francisco and follows along the shore of San Francisco Bay into San Mateo County. There have been wagon roads and later auto roads of sorts along this route for many years, but owing to the rugged topography the expense of constructing a modern boulevard has retarded the construction until now.

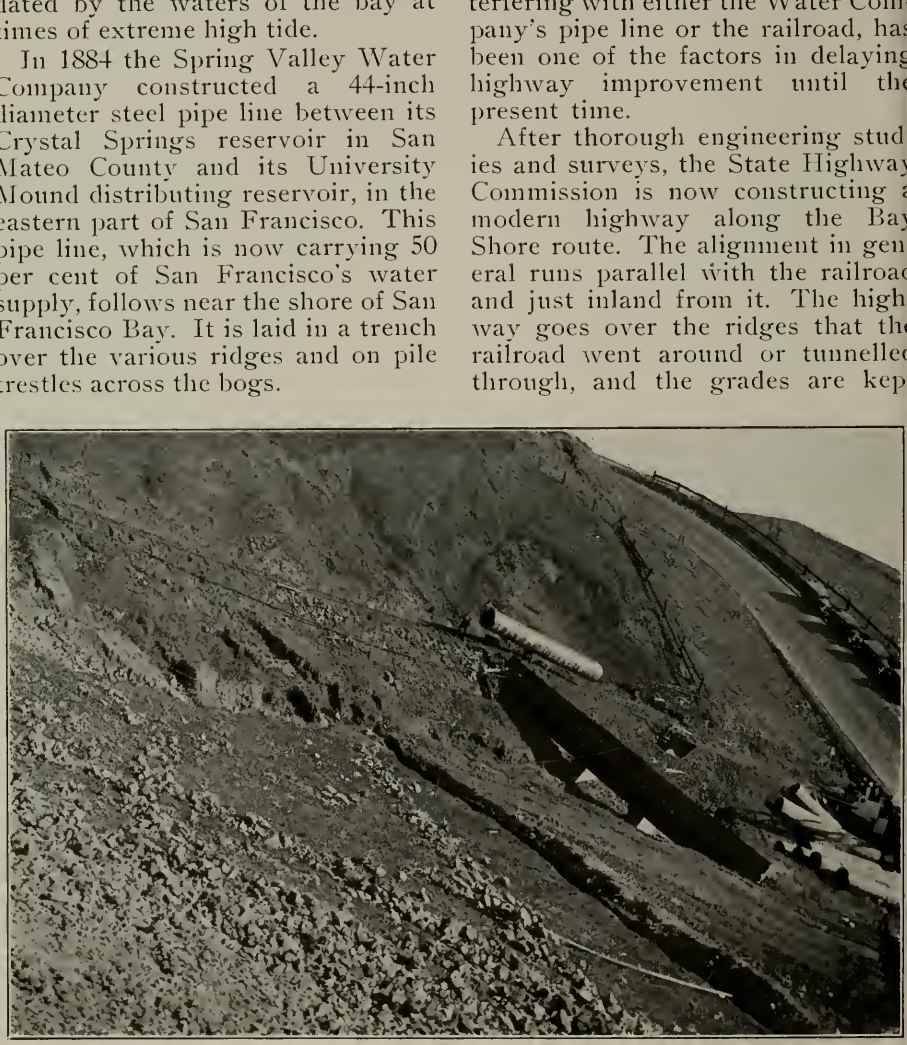
Between South San Francisco and San Francisco a series of steep high ridges extend into the waters of San Francisco Bay. The arms of the bay that at one time extended inland between these ridges have been partially filled with decayed vegetation and material eroded from the surrounding mountains. Thus were formed soft boggy lagoons inundated by the waters of the bay at times of extreme high tide.

In 1884 the Spring Valley Water Company constructed a 44-inch diameter steel pipe line between its Crystal Springs reservoir in San Mateo County and its University Mound distributing reservoir, in the eastern part of San Francisco. This pipe line, which is now carrying 50 per cent of San Francisco's water supply, follows near the shore of San Francisco Bay. It is laid in a trench over the various ridges and on pile trestles across the bogs.

About 1905 the Southern Pacific Railroad Company constructed a double-track line along the bay shore. This railroad was kept on a level grade by driving tunnels through the ridges, and making rock fills across the lagoons.

The economical construction of a modern high-class highway along the shore line without seriously interfering with either the Water Company's pipe line or the railroad, has been one of the factors in delaying highway improvement until the present time.

After thorough engineering studies and surveys, the State Highway Commission is now constructing a modern highway along the Bay Shore route. The alignment in general runs parallel with the railroad and just inland from it. The highway goes over the ridges that the railroad went around or tunnelled through, and the grades are kept



Hoisting pipe sections up inclined railway to the new location. The old pipe line is enclosed in wooden covering at the right center of picture.

ithin reasonable bounds by making eep cuts in these ridges. The rock om these cuts has been used to ake fills for the roadway across the goons. By means of these deep uts and fills the highway engineers ave designed a highway on very ood alignment, with good grades nd easy curves.

The Bay Shore Highway enters an Francisco near the intersection f San Bruno avenue and Third treet, where it will connect with e super-highway system now eing constructed in San Francisco.

The highway engineers found that n order to have a satisfactory alignent for a boulevard without interering with the Southern Pacific ailroad Company's present double-rack line, it would be necessary to ove the Water Company's 44-inch ipe line at four different places, and o build a rock retaining wall and a suspension bridge to carry the pipe at a fifth location. The State Highway Commission arranged with the Water Company to furnish a new right-of-way and construct the pipe line and other necessary structures at the five different locations.

The necessary changes in the pipe line are now practically completed and they embrace the construction of a retaining wall; the construction of a suspension bridge with 170-foot span; the construction of a tunnel 450 feet long; and the construction of four stretches of 44-inch diameter pipe line with an aggregate length of about four thousand feet.

The construction of the retaining wall was done as a part of the general contract for the highway construction while the other items in connection with the Water Company's pipe line were handled

(Concluded on Page 8)

A 30-ft. section of 44" diameter riveted steel pipe with soil proof wrapping, at the top of the inclined railway, above the old Bay Shore Highway, which is seen in the background.

THIS MAP-LIKE PICTURE SHOWS HOW THE SPRING VALLEY PIPE LINE WAS MOV
deepest of the cuts through the hill barriers toward South San Francisco, where thousands of cub
was made with material taken from the cut. The pipe is 44" diameter riveted steel pipe ma
of Western Pipe and Steel Co. There are six bends in this section of the li

NSTRUCTION OF THE BAY SHORE HIGHWAY.—*At the top of the picture is shown the rock were removed to shorten and straighten this important traffic artery. The fill at the left wrapped with special soil proof covering. It was fabricated at the South San Francisco plant carries more than 50 per cent of San Francisco's water supply into the city.*

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EDITED BY RICHARD PROSSER

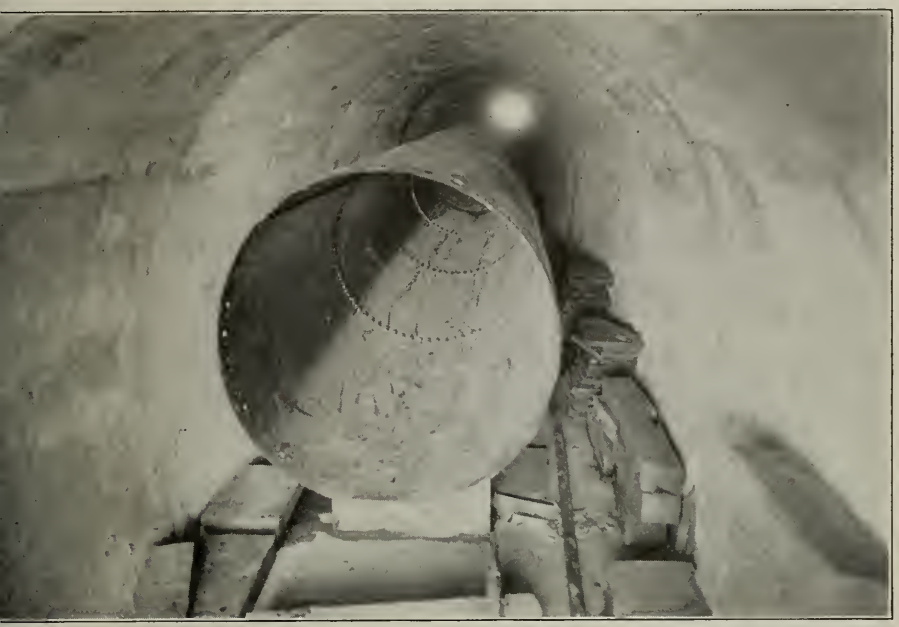
It is with the utmost satisfaction that we present in this issue an article by Mr. T. W. Espy, assistant chief engineer of Spring Valley Water Company, of San Francisco, on the relocation of one of that company's main transmission lines, incident to the reconstruction of the Bayshore Highway.

This work may seem relatively unimportant insofar as the footage of pipe line is concerned but that it is of great importance in the city's water system is evidenced by the fact that the pipe line carries more than 50 per cent of San Francisco's water supply.

Mr. Espy describes, in the forthright and clean-cut language of the engineer, the geographical and topographical factors that controlled both the relocation of the Bayshore Highway and the pipe line that adjoins it. As was stated at the outset of this editorial, we print Mr. Espy's article with gratification because we not only believe in "saying it with experts," but we frankly enjoy the unsolicited commendation of our facilities and service and coöperation from such a high engineering authority.

Mr. Espy, at the end of his article, sees fit to stress the coöperation he received from our organization. From the earliest beginnings of this company, our first consideration has been to give 100 per cent coöperation to every customer, large or small. Perhaps that is one reason why this organization has grown steadily through the years and is now operating five plants, two of which, South San Francisco and Los Angeles, are among the largest factories of their class in this country.

The south portal of the 450-ft. tunnel which was driven through Sierra Point Ridge in the relocation of the Spring Valley Water Company's 44" transmission line.



New pipe in position inside the 450-ft. tunnel which pierces Sierra Point Ridge, South San Francisco. This tunnel was necessary to maintain the required grade.

Looking down into Visitacion Valley where the pipe line was moved to make way for the new Bay Shore Highway. The old highway skirts the buildings in the upper left-hand corner.

(Concluded from Page 3)

through the Water Company; the State to reimburse the company for the cost.

An old landslide is located in the steep hillside of one of the ridges extending into the bay. The pipe line crosses this landslide near its top. The retaining wall is constructed where the excavation for the roadway cut away the toe of the landslide. It was hoped that the retaining wall would keep the landslide from moving but with the first rains of the winter the landslide started to move, and a suspension bridge was constructed by the Water Company as a temporary expedient to support the water pipe where it crossed the slide, several hundred feet uphill from the retaining wall. This work is illustrated in the cover picture of this issue of WESTERN PIPE AND STEEL NEWS.

Just north of this landslide, located on the first steep ridge north of South San Francisco, and known as Sierra Point, the 44-inch pipe line is placed in a tunnel 450 feet long, driven through Sierra Point ridge. This tunnel was necessary in order to keep the pipe line below the hydraulic gradient line.

Western Pipe and Steel Company of California was given the contract for the fabrication and installation of the four thousand feet of pipe line. The digging and backfilling contract was sublet to the Youdall Construction Company. The line is 44 inches in diameter, of riveted steel pipe made from ¼-inch plates 8 feet long. It is dipped in hot asphaltum and wrapped with special soil-proof pipe covering. The pipe was manufactured, dipped and wrapped at the South San Francisco plant of Western Pipe and Steel Company of California, and delivered by trucks as near to the point of installation as possible. They installed an inclined railway from the old Bay Shore Highway to the south portal of the tunnel, and much of the pipe was handled by means of this inclined railway.

On account of the steep hillsides where the pipe was laid, the digging of the ditch and laying of the pipe were much more difficult than is usual on water pipe construction and ingenious methods and machinery were used by the contractors to do the work economically.

Throughout the work Spring Valley Water Company received excellent coöperation from Western Pipe and Steel Company. The problems that arose were solved with promptitude and intelligence. The manufacturing facilities of Western Pipe and Steel Company were unreservedly at our disposal, thus insuring uninterrupted service, and the field crews were handled splendidly, with the result that installation moved forward rapidly and schedule was steadily maintained.

The Cover Picture

The illustration used on the front cover of this issue of WESTERN PIPE AND STEEL NEWS shows the 170 ft suspension bridge which carries the Spring Valley Water Company's 44 riveted steel pipe line across a landslide near South San Francisco. The new Bay Shore Highway, which leaves the original route at the end of the grove of trees on the left, may be noted through the cables. In the background, just beyond the trees is the South San Francisco plant of Western Pipe and Steel Company where the pipe was fabricated.

)VER THE TOP OF ONE OF THE HILLS OF VISITACION VALLEY.—*This picture hows a stretch of the new 44" riveted steel pipe line fabricated by Western Pipe and Steel Co. or Spring Valley Water Company's transmission line, which was relocated to accommodate the new Bay Shore Highway.*

Unquestioned Responsibility in Shop and Field

Designers, Fabricators and Erectors of

STEEL PRODUCTS

Western Pipe & Steel Co.

of CALIFORNIA

444 MARKET STREET
SAN FRANCISCO

5717 SANTA FE AVENUE
LOS ANGELES

FACTORIES

SOUTH SAN FRANCISCO LOS ANGELES FRESNO TAFT PHOENIX

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VOLUME VI FEBRUARY-MARCH, 1929 NUMBER 2

"Western" Adds a New Item to Its Long List of Special Products — A Metered Grease Dispenser

HE "Western" Metered Grease and Oil Dispenser, formerly known as the O. B. Haley Measuring Grease and Oil eter, is now manufactured and sold Western Pipe and Steel Company California under Haley patents.

The "Western" Metered Dis- enser has been perfected after five ears of arduous work, and is offered buyers with the assurance that it oes away with the troubles com- only encountered in lubricating.

Here, at last, is a high pressure bricator that does not leak, that easures with absolute accuracy, nd that will not blow off the hose and waste ease. It is invaluable for garages, service ations, oil companies, manufacturing plants, or wherever gh pressure lubricating equipment is needed.

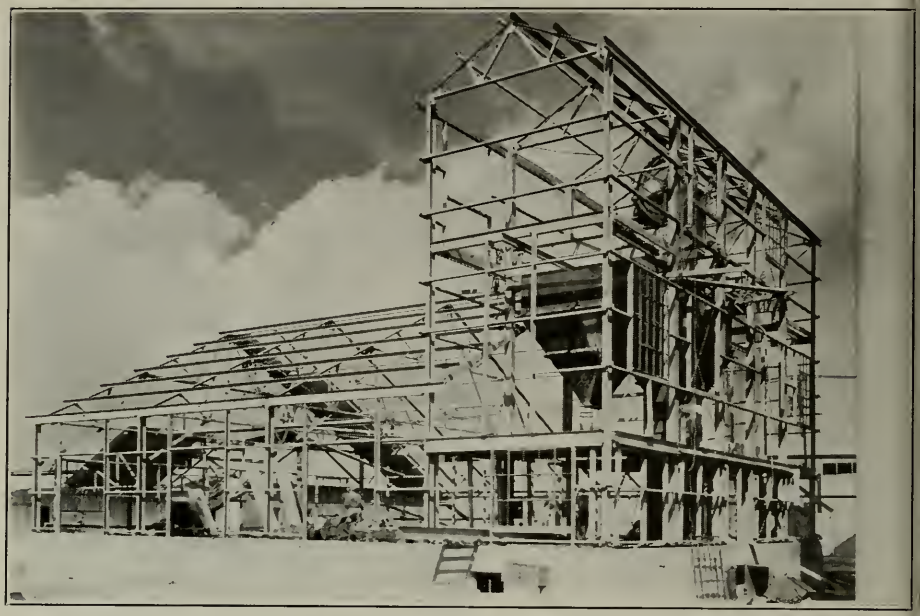
Our meter holds the first certificate of accuracy issued the Department of Weights and Measures of the State of California. It fully covered by patents and will measure accurately, under varying pres- ires, all grades of oils and greases, from the lightest motor oil to the eaviest transmission and differential greases.

The meter is made in two models. Model "A" is used for measuring trans- ission and differential greases and is marked in half-pounds and pounds. odel "B" is used for measuring motor oils and is marked in pints, quarts nd gallons.

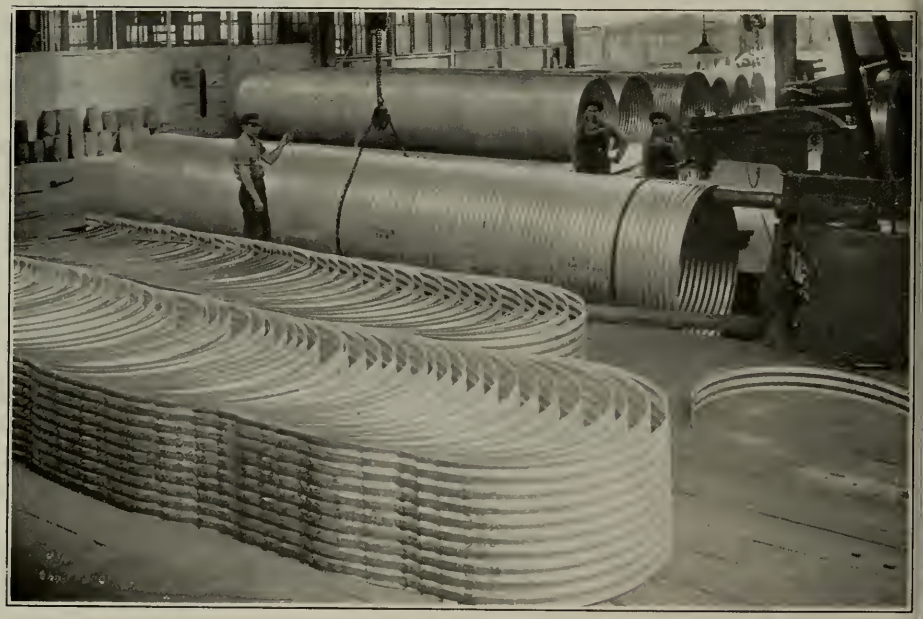
The meter may be purchased separately, and in large oiling and greasing tablishments has proven itself a time-saver.

The "Western" dispenser is built to conform to requirements of the merican Society of Mechanical Engineers and the California Industrial ccident Commission. Every tank is stamped either "A.S.M.E. Standard ressure Vessel" or "California Standard Tank," and carries licensed manu- cturer's number issued by the above authorities.

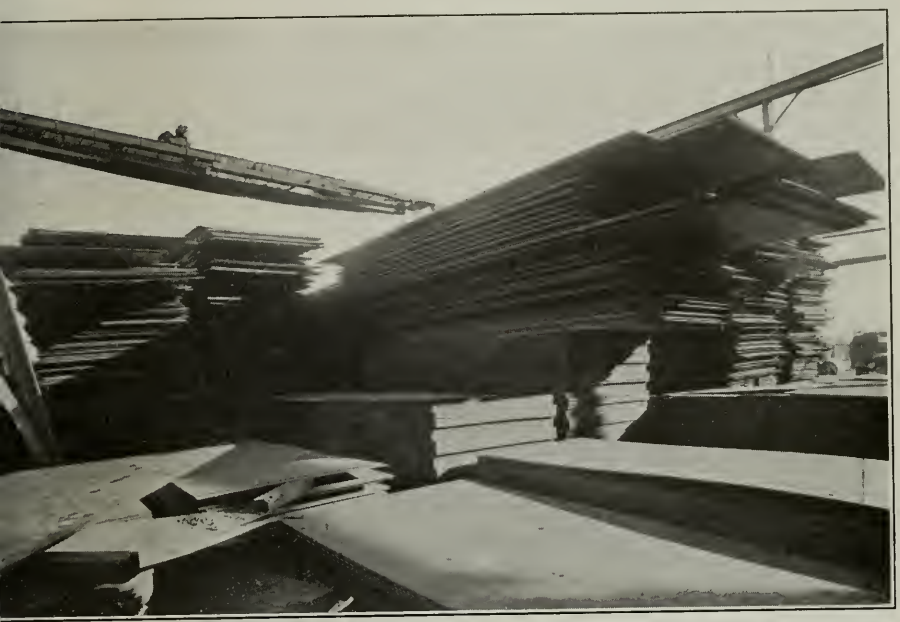
Any one of several types of high pressure boosters for greasing shackle olts, etc., can be used with this dispenser.



Our Los Angeles plant fabricated and erected the structural steel for this building. It is the packing house of the Blue Diamond Co. at Los Angeles.

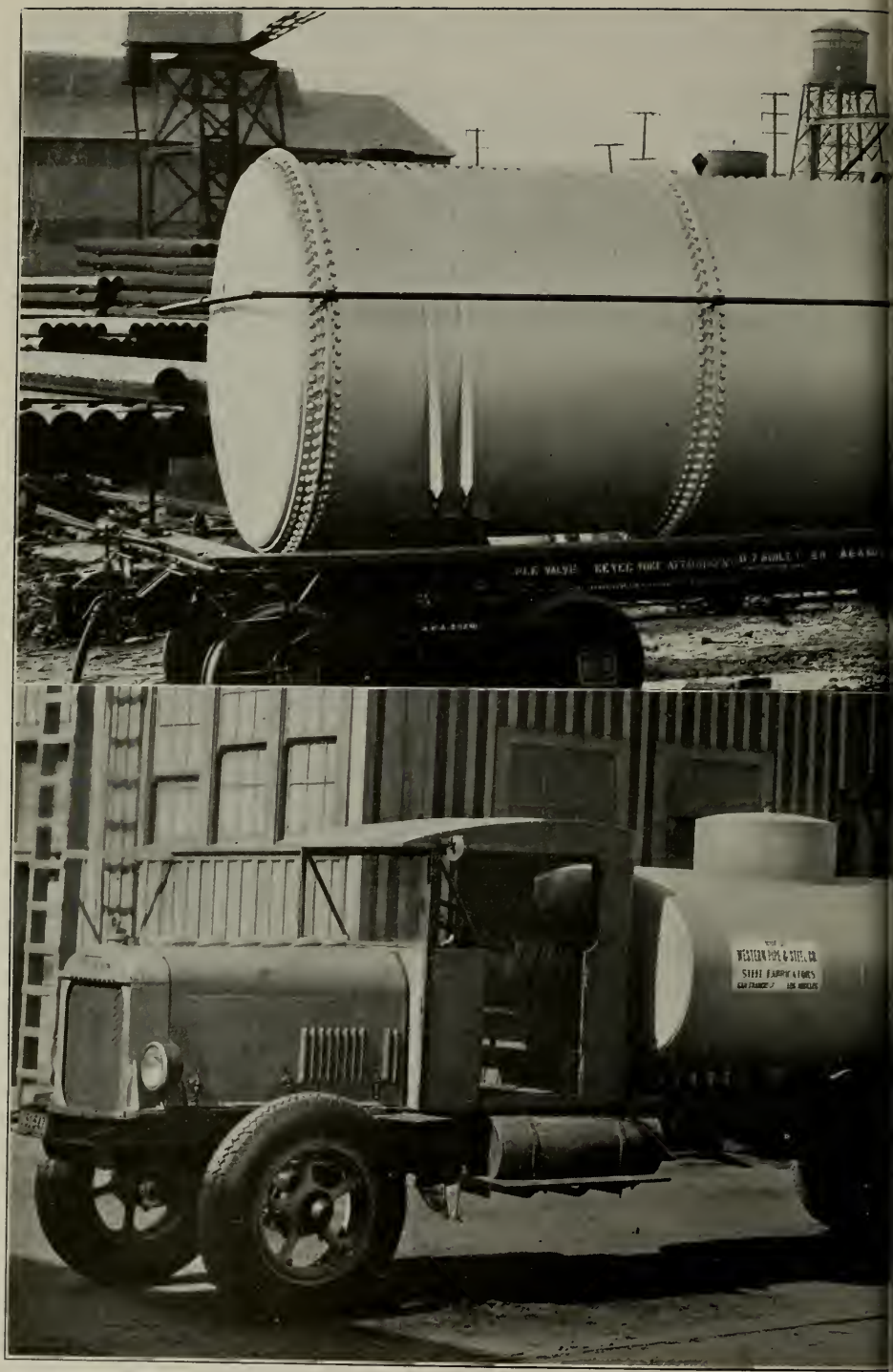


A corner of the culvert shop at our South San Francisco factory. The picture shows 60-inch diameter galvanized corrugated culvert pipe for East Bay Municipal Utility District.



This picture shows a portion of the steel plate stock at our Los Angeles plant. When this picture was taken there were over 20,000 tons of steel on hand at Los Angeles.

In order to give spot delivery on bolted tanks, we make them up in advance as shown in the picture above. This is a great convenience to the oil industry, which usually wants its bolted tanks in a hurry.



THE ILLUSTRATIONS ABOVE SHOW TWO INTERESTING EXAMPLES OF S
steel tank car for the transportation of petroleum products. It was fabricated at our Lo
Francisco plant for the Pacific Truck Service, San Jose. This truck and trailer

RNED OUT BY WESTERN PIPE AND STEEL COMPANY.—*At the top is a bolted he Western Tank Car Co. Below is a tank truck and trailer made at our South San rting gasoline, and the combined capacity of the two tanks is 6,000 gallons.*

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IN this issue of WESTERN PIPE AND STEEL NEWS we again bring to the attention of our readers the "specialities" in steel fabrication, which form a large portion of the output of our five factories. The illustrations tell their own story of variety and versatility. Probably no other concern in the West in the same field can show as wide a range of steel products.

The cover picture, for instance, depicts a new article—the "Western" Grease Dispenser. Although this dispenser has only been in production a short time it is already a best seller.

There is one illustration that is of particular interest because it explains why Western Pipe and Steel Company of California is able to make good its reputation for promptness in the execution and delivery of orders. We refer to the picture showing a part of the stock of steel plates at our Los Angeles plant. On the day this picture was taken there were over 20,000 tons of steel on the ground at this one plant. This policy of carrying at all times an ample stock of steel makes it possible for us to effect early delivery on practically every order.

Other pictures herein show such widely diversified products as galvanized corrugated culverts, bolted tank stock, truck tanks, railroad tank cars, galvanized water tanks, ice cans, structural steel, steel silos, steel pipe, etc.

To quote from the foreword of our general catalogue—which we will be very glad to send on request: "An idea of our facilities and manufacturing range may be gained . . . from the products pictured and described. Those familiar with equipment such as we operate will understand that because of the versatility of modern machine tools we actually manufacture a greater variety of products than can be catalogued. In other words, with our equipment, experience and technical knowledge, we are in a position to execute orders for any product fabricated from steel sheets or plates or structural material, for practically every line of endeavor in which equipment built of steel is used."

The Eighth Annual Convention of the California Certified Boiler and Elevator Inspectors was recently held in San Francisco. One of the special features of the convention was a visit to the South San Francisco plant of Western Pipe and Steel Company.

Boiler and Elevator Inspectors Visit W. P. & S. South San Francisco Plant

By F. A. Page, Chief Inspector of Boilers

The Eighth Annual Convention of California Certified Boiler and evator Inspectors was held at the vic Auditorium in San Francisco, nuary 8, 9 and 10, under the aus-ces of the California Department of dustrial Relations, Division of In-strial Accidents and Safety.

The outstanding feature of the con-ntion outside of the sessions, was e visit to the South San Francisco ınt of Western Pipe and Steel ompany of California.

The trip through this modern and -to-date factory for the fabrication steam boilers, air pressure tanks, d in fact every conceivable kind of el plate work, was indeed interest-g and illuminating. Of particular erest was the magnitude of the fa-ities and the wide range of modern uipment which the Western Pipe d Steel Company has installed to et the needs of its customers.

It is the function of boiler and ele-tor inspectors to make buildings, tories, homes and places of public thering safe for the people. The in-spector is the Sherlock Holmes of in-dustry, whose duty it is to look for hidden flaws, defects and other un-safe conditions. The whole country now knows how important their work is in modern life.

Most important to their success is the whole-hearted co-operation of manufacturers. This consists not only of extending every facility for shop inspection, but also the filming of such inspection work for educa-tional purposes.

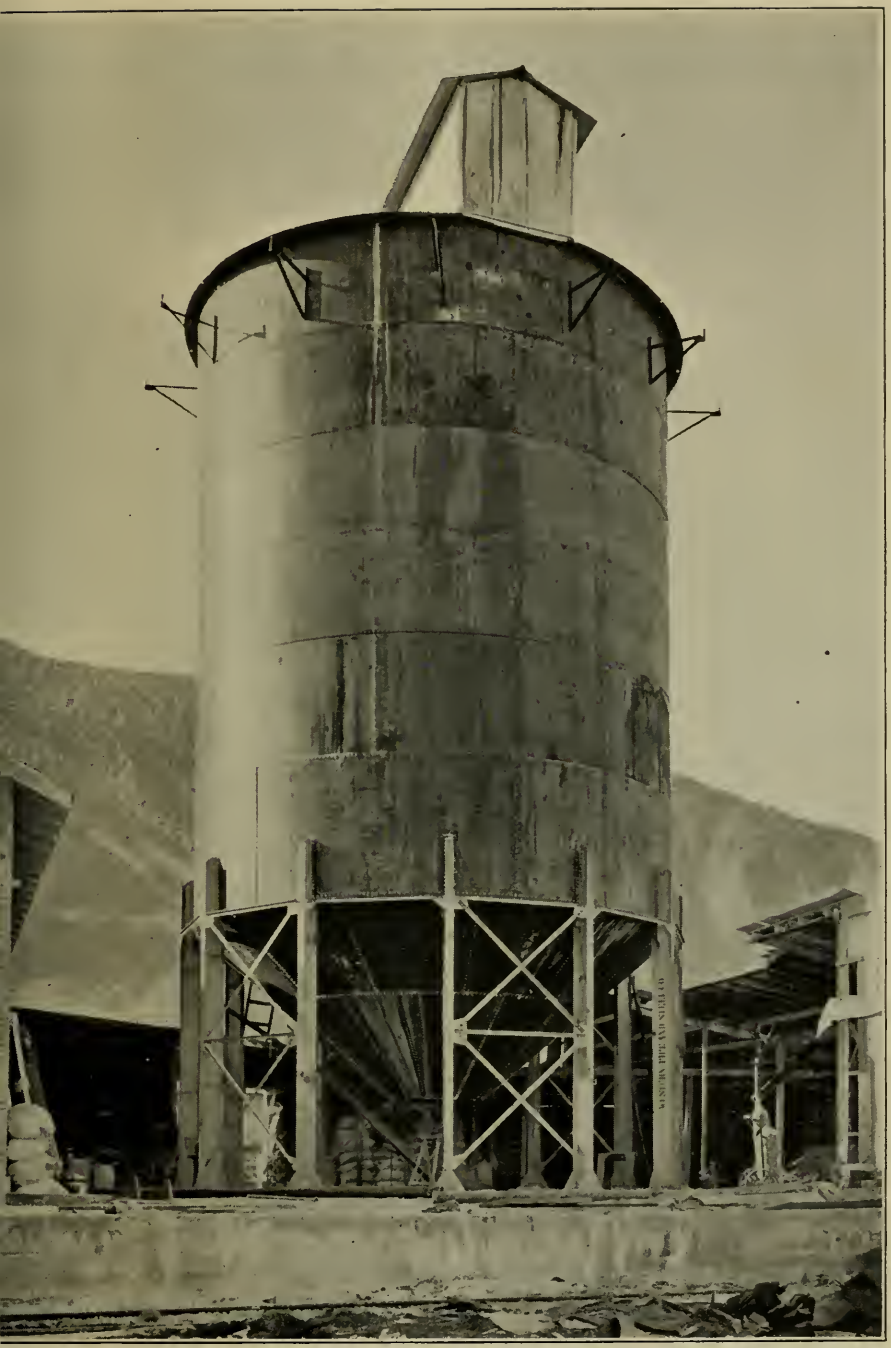
In the ranks of our inspectors there are not only expert mechanics who have had actual boiler experience, but also mathematicians and scientists who devote their efforts to the cause of humanity.

The secret of our success is co-operation. Nowhere in this country do men work closer, shoulder to shoulder, for the preservation of life and the prevention of suffering. Their knowledge and experience is not for anyone alone, but for all. I know of no nobler work to which a man can dedicate his life.

Above and opposite we reproduce photograph taken at South San Francisco. The party was headed by Frank Page, Chief Boiler Inspector of the State of California, and C. D. Thomas, Chief Boiler Inspector of the State of Oregon.

A trainload of Ferrum banded steel pipe for the San Joaquin Light & Power Corporation. This pipe was for a high head penstock.

View of plate shop at our Los Angeles plant. This picture shows the wide variety of products which we fabricate and also gives some idea of the magnitude of the shop.



THIS STEEL SILO WAS FABRICATED AT OUR LOS ANGELES PLANT.—*Designed o hold soda ash, this silo is 30 feet in diameter and 50 feet in height. It was made for the nyo Chemical Co., and installed at their plant at Cartago, California. The structural steel supports were also fabricated by Western Pipe and Steel Company.*

"WESTERN"

METERED GREASE DISPENSER

[HALEY PATENTS]

A
Dial Measuring
up to 12 Lbs.

B
Slot-Faced
Air-Pressure
Gauge

C
Gooseneck
Discharge

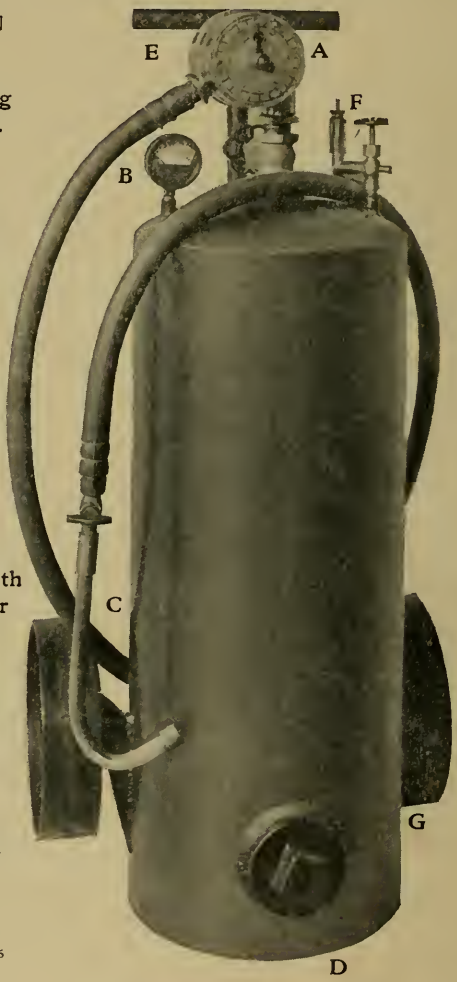
D
Convenient
3-Inch
Filling Plug

E
Meter Head With
Piston Adjuster

F
Combination
Filling, Relief
and Safety
Valve

G
10-Inch Wheel
with 3-Inch
Tread

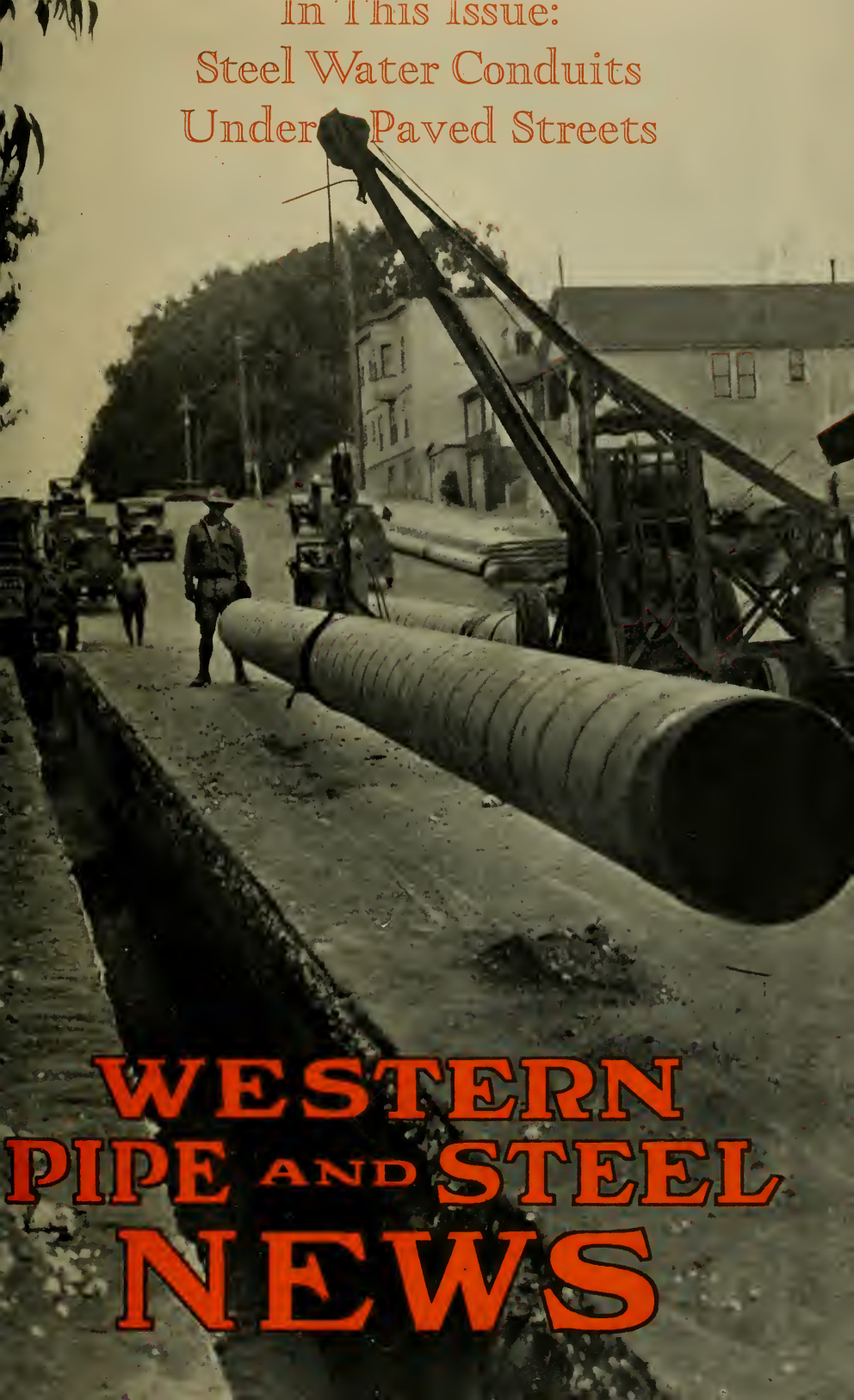
PATENTED DEC. 21, 1926



THE "WESTERN" METERED GREASE DISPENSER

The diagrammed cut above shows the different parts and features of the "Western" Metered Grease Dispenser. We call particular attention to the measuring dial, and also to the valve "F" which is a combination filling, relief and safety valve. It will be noted that the dispenser is of unusually rugged construction throughout.

In This Issue:
Steel Water Conduits
Under Paved Streets



WESTERN PIPE AND STEEL NEWS

SPRING VALLEY WATER CO.'S NEW SIX-MILE STEEL PIPE LINE.—*This view shows installation of steel pipe under pavement on Masonic avenue looking north towards Geary street. It will be noted that there is no interference with traffic.*

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SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI APRIL, 1929 NUMBER 3

Some Arguments in Favor of the Use of Steel Pipe in Water Distributing Systems

FOUR years ago we had the pleasure of publishing an article on the use of steel pipe, by William Mulholland, then Chief Engineer of the Bureau of Water Works and Supply of the City of Los Angeles. Out f his fifty-odd years of experience, Mr. Mulholland drew certain conclu-ions, which are reflected in the following excerpts:

"Where soil and drainage conditions are good, the use of riveted steel for runk line construction is favored . . . due to the fact that the trunk line is sually operated under a high head; and steel for this reason is considered nore economical as well as involving less risk, as these lines generally raverse a well-developed portion of the city, acting as a booster or feeder o the entire grid system. . . .

"A very important feature in the operation of trunk lines constructed of teel is that of repairs in the case of leaks. A steel pipe operating under a igh head will give warning by damp spots or small pools of water accumu-ating along its course, so it is a fairly easy matter to uncover this pipe and nstall patches or caulk the metal if the trouble is in the seams. In other ords, no great damage ever occurs from leaks or breaks in steel pipe, hereas in cast iron trunk lines of large diameter operating under a high ead, whenever they do give way, there is usually a rupture that will release he entire capacity of the line with very destructive effect, resulting in in-onvenience to traffic and heavy damage to property and street improve-nents.

"In a fast growing community such as Los Angeles, it has been necessary ithin the past few years to change the grades of various trunk lines to onform to new street grades. In many instances we have had to lower runk lines, varying in diameter from 24 to 40 inches, several feet. This work as always been accomplished without interruption to the service; for xample, we have lowered quite recently 1500 feet of forty-inch by five-ixteenths-inch line a distance of from three to six feet. This was accom-lished without turning off the water and not a single rivet was sheared nor leak developed throughout the entire distance of 1500 feet. This particular hase in the use of riveted steel pipe conclusively emphasizes the economic alue to be obtained under these circumstances.

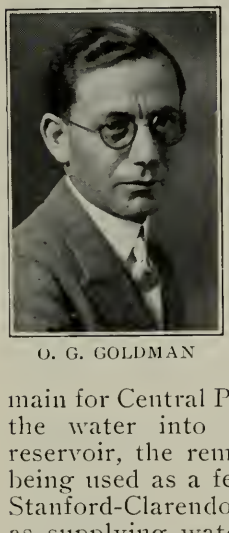
"The records obtained in exposing the various steel lines in our system, or making new connections and taps, are evidence that steel is a proper onduit for water lines. This is particularly true where soil conditions are ood; and, in fact, lines that have been in the ground more than thirty years nder favorable soil conditions show that the original dip, both on the inside nd the outside, is still intact and in good condition."

Spring Valley Water Company's New Feeder Main for San Francisco

By O. G. Goldman

Assistant Superintendent, City Distribution Department, Spring Valley Water Company.

Starting from a point in the southerly part of the City of San Francisco about one mile from the county line, and running in a northeasterly direction across the city, the Spring Valley Water Co. has installed a new feeder main consisting of about six miles of steel pipe 24", 20" and 16" in diameter. The first part of this pipe line acts as the discharge main for Central Pumps, discharging the water into Stanford Heights reservoir, the remainder of the line being used as a feeder main for the Stanford-Clarendon districts as well as supplying water to the Presidio Heights district.



O. G. GOLDMAN

The Stanford-Clarendon district was formerly supplied with water from the Seventeenth Street pump station by means of steam driven pumps of the plunger type. These pumps received their water from the feeder main coming from University Mound reservoir, having been erected in 1895, and were in continuous operation until a short time ago.

Presidio Heights district was formerly supplied by Black Point pump station, and like the above station received its water from University Mound reservoir, the pumps being similar in type to those of the Seventeenth Street pump station. The original station was built in 1860 and remained in use until 1892, when it was dismantled and new pumping units installed, which have remained in continuous service until recently.

Central Pumps, erected in 1912, which formerly supplied water to the Lake Honda district, has been reconstructed to pump into Stanford Heights reservoir. The pumping engine in this station was steam driven of the Corliss cross-compound direct connected plunger type. This unit has been replaced by steam turbine driven centrifugal pumps of the most modern type. The station contains two complete pumping units, each having a range in capacity of from two to nine million gallons per day.

Seventeenth Street and Black Point pumps have been shut down and are held as standbys in case of emergency.

The rearrangement of the system whereby the Presidio Heights district receives its water from the Stanford-Clarendon district, required additional storage to be built at Stanford Heights reservoir. For this reason the second half of the reservoir was built, increasing the storage from five million to eleven million gallons.

The new feeder main required in conjunction with the rearrangement of the system consisted of about 31 000 feet of 24", 20" and 16" diameter pipe. This pipe line starts at the Central Pump station and runs to Stanford Heights reservoir and is 24" in diameter. From this reservoir the line was laid to Clarendon Heights

nk and consists of 20″ and 16″ pe; leaving Clarendon Heights tank 20″ diameter pipe line was run to residio Heights tank. Due to the fference in elevation of Stanford eights reservoir and Presidio eights tank (the reservoir being at evation 614 feet above sea level, hile the tank is at elevation 400 et) pressure regulators were inalled at the end of this 20″ pipe line here it connects to the Presidio eights tank district.

The material used for the pipes as steel plates ¼″ and 3/16″ thick r the 24″ and 20″ diameter pipe and o. 10 gauge for the 16″ pipe. It was completely welded pipe line. The ates were sheared, rolled and the ams welded on automatic electric elding machines, forming a section 4 feet long. Two of these sections ere placed together, forming a butt oint, and electrically welded toether by hand, making a finished ngth of pipe 28 feet long. Each ngth was placed in a testing maine and filled with water, pumped a pressure 50% greater than that r which it was designed, and careilly inspected for defects. All welds hich showed any sign of leaking ere cut out and rewelded, electriilly, by hand. As the pipe successilly passed the testing machine, it as carefully dried, dipped and rapped, and accepted for installaon in the pipe line.

The fabrication of this pipe was by Vestern Pipe and Steel Company of alifornia at their South San Franisco plant.

The pipe was hauled from Western ipe and Steel Company's plant by neans of motor trucks and trailers, nd distributed along the route of the ipe line. Only enough pipe was rought to the job to keep ahead of ne work. This limitation was necesary on account of the many private arage entrances encountered.

All field joints were welded by the oxyacetylene process. Where it was possible, two lengths of pipe were welded together above the ditch and then lowered into place. The bends and fittings required for this line were made in the field, from a piece of straight pipe of the proper dimension. This was thought advisable since, by this method, the field welders were always kept busy when difficulties were encountered due to obstructions met in opening the ditch, which were many.

What may be expected in the laying of a pipe line in the residential areas, was illustrated in Lyon street, between Bush and Pine streets. Here, within a distance of less than 150 feet, were found 17 services, water and gas, varying in depth from 2.5 to 3 feet.

Air valves were placed at all high points in the line. These were of the automatic type to which was added a new feature, designed by the writer. Experience has shown that when filling a pipe line, the rush of air and water will close an air valve, and it is almost impossible to release the entrapped air without shutting down. To overcome this difficulty a hole was drilled through the stem of the air valve and a set screw inserted. By releasing this screw the entrapped air could be released, and as soon as water flows, it is reset, sealing the opening.

San Francisco being gridironed with an electric street car system, electrolysis may cause a great deal of damage to steel structures located under ground. To overcome this possible destruction, resistance joints were placed in the pipe line on each side of the street on which a car line is located. Each complete joint consisted of three bands about three feet apart. The bands were 12″ wide and were 1″ larger in diameter than the

Continued on Page Seven

INSTALLATION OF WELDED STEEL PIPE FOR SPRING VALLEY WATER C

Golden Gate Park Panhandle. This view shows a number of interesting features of
terference with the regular flow of traffic. It also shows the absence of bell holes, and th
the second

FEEDER LINE, SAN FRANCISCO.—*Looking down Masonic avenue towards the n, the fact that it is possible to install steel pipe lines under paved city streets without in- ation of welding field joints. Backfilling has been completed in the block beyond and in en replaced.*

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY
of California
444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles
EDITED BY RICHARD PROSSER

It seems appropriate in this issue of Western Pipe and Steel News, which tells of Spring Valley Water Company's new six-mile steel pipe line in San Francisco, to publish a bit of history concerning some pipe laid nearly six decades ago.

Accordingly, we reprint, by permission of the *Engineering News-Record*, the following article:

The Spring Valley Water Company, which serves the City of San Francisco, has recently taken up a 30-in. riveted water main that has been in the ground 58 years. After cleaning up the 30-ft. sections of this pipe they were found to be still in serviceable condition and in all probability most of them will receive a new protective coating and be again put in service.

The main, known as the San Andres pipe line, was put in service in 1870, buried in a sandy, yellow clay, working under a pressure of 55 lb. per sq. in. The plates from which the pipe was made are wrought iron, ⅛-in. thick, and since they do not conform to any gauge, they must have been specially rolled to this thickness. The protective coating on the pipe was that usually applied by the company at that time and consisted of natural asphalt mixed with varying amounts of coal tar.

The main was in service continuously from 1870 to 1922, when about 3,000 ft. of it was replaced by a new line made necessary chiefly because the old line had been built before the streets were laid out. Also two short portions of the line close to a street railway substation had been damaged by electrolysis in the absence of any provision for mitigating electrolytic effect. Since 1922 the pipe has been out of service, but was left in the ground until street grading necessitated its removal.

To make careful examination of its present condition several lengths of the pipe were brought to the yard and the adhering earth was washed off, care being taken, both in handling and in cleaning, to keep the coating from coming off the pipes. Despite these precautions some of the coating was jarred loose, but the condition of the metal in the bare spots showed that the coating had come off with the adhering clay and had not been previously loosened.

The outside surface of the pipe was in almost perfect condition: The inside was tuberculated over its entire area, the tubercles being mostly about ½-in. high, with some rising to the height of 1-in. After cleaning these tubercles from the inner surface, large shallow pits were found ranging from 1/64-in. to 3/64-in. in depth. None of these pits extended as much as half way through the pipe thickness, and on the whole the metal was in such good condition that it was considered worth while to clean the pipe sections thoroughly and give them another protective coating preparatory to further service.

For the foregoing information *Engineering News-Record* is indebted to George W. Pracy, engineer of distribution, Spring Valley Water Company.

THE COVER PICTURE

So efficiently was the work planned and organized on the installation of Spring Valley Water Co.'s six-mile crosstown line, that pipe-laying operations followed right on the heels of the trenching machine, as shown in the cover picture. Trenching, pipe-laying, backfilling and repaving operations were frequently carried on in the same block.

ntinued from Page Three

ıtside diameter of the pipe, the ends the pipe being inserted under the ınd four inches. The area between e pipe and the band was then filled ith pure cement hammered in place, ınilar to the making of a joint in ·ll and spigot pipe, the distance be-ɤeen the two ends of the pipe under e band being filled with a wooden rm which was removed as soon as e joint was made.

In order that the short sections of e pipe, where the weld was made, ıould have as long a life as the re-ainder of the pipe, which had been ɹefully dipped, it was necessary to eat the joint both inside and out-de. This was done by painting, sing special paints made for that ırpose. It was also necessary to do ıe painting in such a way as not to ·lay the welding. This meant that ıe cleaning and painting had to be ɔne as far as 300 to 400 feet from ıe end of the line. Considering the ameter of the pipe line, namely 24″,)″ and 16″, it was next to impossible ɔr the men to crawl that distance. , therefore, became necessary to ɔnstruct special four-wheel buggies ı which the men could lie and pro-ɜl themselves. So as not to mar the ip on the pipes the wheels were ıbber tired. By means of these bug-ies it was possible for the man to go to the pipe line as far as 1000 feet - more if necessary. Due to the fact ıat the line was laid in hilly country, ıe air valve and blow-off openings ·eated sufficient draught, so that the ıen were able to stay inside the pipe ɔr hours at a time without the slight-st ill effect. In fact, the draught was : times so great as to set fire to the ip inside the pipe, next to a welder.

The entire length of the ditch was ıg by means of a power-driven ·enching machine, except at the im-ortant street crossings. At these intersections, the trenching machine would dig as far as the curb line, skip one-half of the street crossing and then proceed digging the trench. The skipped section of the street crossing would be dug by hand, after the other half had been bridged. In this way the traffic was always kept moving at almost normal rate.

The width of the trench was 6″ greater than the diameter of the pipe, and the average depth was 4.5 feet. As soon as the trench was to proper grade, the pipe was lowered in place, lined up with the section behind it and tacked fast, the actual welding of the joint being done later. When the joint was welded and cold, it was painted and wrapped, the trench backfilled, the excess material being taken away at the same time. After the backfill had stood about one week, the trench was repaved, important street crossings being re-paved as soon as backfilled. Where it was impossible to get the pipe laid and the trench backfilled in front of a driveway the same day in which the ditch was dug, a wooden bridge was built over the trench for the night.

The total length of each size of the pipes laid in this feeder main is as follows: 8,897 feet of 24″, 17,906 feet of 20″ and 4,170 feet of 16″. The minimum length of 24″-pipe laid in any one day was 67 feet, the maximum being 633 feet with an average of 247 feet. In the case of the 16″-pipe, the minimum was 140 feet, the maximum 463 with an average of 252 feet per day. The 20-inch was laid in two sections, the first being 4,875 feet long, the second containing 13,031 feet of pipe. In the first section the minimum laid was 85 feet, with a maximum of 588 feet, the average being 325 feet. For the second section the minimum was 56 feet, the maximum 504 feet, the average per day being 271 feet.

Installing steel pipe under sidewalk at Geary street and Masonic avenue, San Francisco. The curb was not disturbed.

A right angle turn under streetcar tracks. In such locations resistance joints were placed on each side of the street, to prevent electrolysis.

INSTALLATION OF STEEL WATER PIPE FOR SPRING VALLEY WATER CO., SAN FRANCISCO.—*The Presidio Heights tank is seen in silhouette at the top of this picture. This is Lyon street, with the original paving of cobblestones that probably served as ballast in some old time sailing ship.*

Unquestioned Responsibility in Shop and Field

Designers, Fabricators and Erectors of

STEEL PRODUCTS

Western Pipe & Steel Co.

of CALIFORNIA

444 MARKET STREET
SAN FRANCISCO

5717 SANTA FE AVENUE
LOS ANGELES

FACTORIES

SOUTH SAN FRANCISCO LOS ANGELES FRESNO TAFT PHOENIX

WESTERN PIPE AND STEEL NEWS

In This Issue:

Some Historical Notes on
Western Pipe and Steel Company
of California

Executive Officers

Illustrations of Plants

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

EXECUTIVE OFFICERS

James A. Talbot, President

Howard G. Tallerday, Executive Vice-President

L. N. Slater, Vice-President

W. G. Aldenhagen, Vice-President and Treasurer

R. D. Plageman, Vice-President

W. G. Aldenhagen, Secretary

E. M. Durfee, Assistant Secretary

.....

L. W. Delhi, Assistant Manager, San Francisco

F. F. Dickey, Assistant Manager, Los Angeles

T. R. Rooney, General Superintendent, San Francisco

P. L. Sterkel, General Superintendent, Los Angeles

.....

BRANCH MANAGERS

J. W. Hall, Fresno

A. A. Burden, Phoenix

H. R. Hammett, Bakersfield and Taft

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA
SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI AUGUST, 1929 (SPECIAL) NUMBER 4

Some Historical Notes Regarding Western Pipe and Steel Company of California, and a Statement Regarding the Company's New Policy

With this issue of Western Pipe and Steel News, there is inaugurated a new policy in the affairs of Western Pipe and Steel Company of California. Heretofore the company has been a close corporation with all of its stock closely held. Under the new policy there has been a distribution of shares, in large part to officers and employees of the company, and in part to investors.

Coincidental with the inauguration of this policy comes the announcement that Mr. J. W. Mason, who, as president, has served the company faithfully and well for a number of years, retires and is succeeded by Mr. James A. Talbot, one of the original founders and incorporators of the company in 1907.

At that time Mr. Talbot was manager of the Thomson & Boyle Company, with which he had been identified since 1900. The Thomson & Boyle Company was founded in 1886, and was one of the pioneers in its field in the south. From this it will be seen that the history of Western Pipe and Steel Company of California in the southern part of the State goes back forty-three years. Throughout this long period the manufacturing activities of the company have been closely related to the development, transmission and distribution of water, to supply a region that through all these decades has recorded a population growth unparalleled in history.

When Mr. Talbot and his associates took over the Thomson & Boyle Company in 1907, its property consisted of a small plant in Los Angeles whose principal products were well-casing and water pipe. The business soon outgrew these facilities and in 1908 a new plant was erected. Keeping pace with the phenomenal growth of Los Angeles and Southern California, the company selected a new location and in 1921 erected at Santa Fe and Slauson avenues, Los Angeles, one of the largest steel fabricating plants in the West.

Meantime the company had expanded its manufacturing activities into Northern California. In 1910 the San Francisco plant of the Francis Smith Company was purchased and moved across the bay to Richmond. Through

this predecessor, the history of Western Pipe and Steel Company in Northern California goes back into "the days of old, the days of gold," almost to "the days of '49," for the Francis Smith Company was established at Grass Valley in 1854 to manufacture riveted water pipe for the hydraulic miners of that famous camp. A plant was opened at San Francisco in the early sixties. When this plant passed to Western Pipe and Steel Company in 1910 and was transferred to Richmond, the aura that surrounds pioneer industries went with it and is still preserved in the traditions of this organization.

In 1917, Western Pipe and Steel Company purchased the plant of the Schaw-Batcher Company on tidewater at South San Francisco. At the behest of the Government, this plant was converted into a shipyard to build freighters sorely needed to help win the war. Western Pipe and Steel Company launched approximately $35,000,000 worth of steel steamships here for the United States Shipping Board and the Emergency Fleet Corporation. The shipyard was dismantled after the war when the Shipping Board contracts were completed, and the plant was reconverted into a modern shop for the fabrication of steel products.

In 1921 the Richmond plant was dismantled and consolidated with the South San Francisco factory. Some four years ago this plant was further enlarged by the addition of a new heavy plate shop 80 feet wide and a quarter of a mile long. This shop was fitted with the most modern equipment, including machinery for the fabrication of lock-bar steel pipe, riveted and welded pipe, steel tanks, etc.

For some years past the company has been operating five plants for the fabrication of steel products. They are situated at South San Francisco, Los Angeles, Fresno, Taft, and Phoenix. The offices and plants of the company employ an average of 1500 people. The products of its factories are sold along the entire Pacific slope. Its territory is bounded on the north by Alaska, on the south by Panama, on the east by the Rockies, and on the west by Hawaii.

The South San Francisco plant covers approximately thirteen acres, including a ship basin which has a channel leading to the deep waters of San Francisco Bay.

The Los Angeles plant covers approximately seventeen acres. These two plants rank among the largest industrial units of the West.

Today Western Pipe and Steel Company enjoys a position as a leading manufacturer of steel tanks for oil storage, oil-well casing, refinery equipment, etc., as well as steel pipe for the transmission of water, oil and gas; structural steel, culverts, and general sheet and plate work.

Under the new policy of employee and public ownership of the company and a continuation of its management by old and tried officers and employees, it is confidently expected its past growth and prosperity will continue.

JAMES A. TALBOT

AMES A. TALBOT, president of Western Pipe and Steel Company of Califor-ia, has been identified with the steel business since February, 1900, when e joined the organization of the Thomson & Boyle Company at Los An-eles. This company was a pioneer in its field, having been organized in 886. Mr. Talbot was manager of Thomson & Boyle Company at the time f the formation of Western Pipe and Steel Company, which he and a roup of associates organized in 1907, and which took over the older com-any in that year.

In the twenty-two years that have elapsed, Mr. Talbot, with the assistance f his co-workers, has brought Western Pipe and Steel Company of California o front rank position in the fabrication of steel products. Aside from this, is business activities have ranged through a wide and varied field. He is chairman of the Board of Directors of Richfield Oil Co.; chairman of he Board of Fokker Aircraft Corporation; director of Western Air Express.

Although he is interested in many other lines, he retains the active execu-ive office of president in the direction of Western Pipe and Steel Co.'s affairs.

HOWARD G. TALLERDAY

Howard G. Tallerday, executive vice-president of Western Pipe and Steel Company of California, has been with the organization since 1908. Prior to that he had some ten years of experience in the manufacturing, selling, and installation of products similar to those manufactured by this company.

Mr. Tallerday was made manager of the Los Angeles plant in 1912. In 1915 he was elected a member of the Board of Directors of the company. Three years later, in 1918, he came to San Francisco as manager, where he has since made his headquarters. In 1924 Mr. Tallerday was advanced to the position of vice-president.

Mr. Tallerday is of that type of executive who has come up through the manufacturing side of the industry to which his career has been devoted. Hence he is on terms of unusual familiarity with the manufacturing problems that constantly arise in an organization of such far flung and diversified activities as Western Pipe and Steel Company.

L. N. SLATER

L.N. Slater, vice-president of Western Pipe and Steel Company of California, has been with the organization since 1913. His first position was that of salesman in the Sacramento Valley where he spent several years. In 1918 he was appointed manager at Bakersfield and Taft.

He was transferred to Los Angeles as assistant manager in 1924 and was appointed manager of the Los Angeles plant January 1, 1926. At the same time he was elected a member of the Board of Directors.

A native of Buffalo, New York, Mr. Slater took a course in civil and hydraulic engineering at an Eastern college. In 1909 he was sent to California by W. S. and J. S. Kuhn of Pittsburgh, in connection with the Sacramento Valley Irrigation District.

He was engaged in this and similar work for four years prior to joining the organization of Western Pipe and Steel Company. He is in executive charge of the company's affairs in Southern California.

W. G. ALDENHAGEN

W. G. Aldenhagen, vice-president and treasurer of Western Pipe and Ste Company, has been with the company since 1917. A native of Indiana, M Aldenhagen took Horace Greeley's advice and came West in 1906. H entered the service of the Southern Pacific Company in the engineering d partment at Portland.

Two years later he was employed by the Rogue River Electric Compan as an accountant and when that company afterward merged with others t form the California-Oregon Power Company, Mr. Aldenhagen was mad chief accountant and later general auditor.

In 1917 he left the latter company to join Western Pipe and Steel Com pany in charge of accounting and finance.

Mr. Aldenhagen was made secretary of the company in 1917. In 1927 H added the duties of treasurer to his work, and in 1928 he was elected a men ber of the Board of Directors.

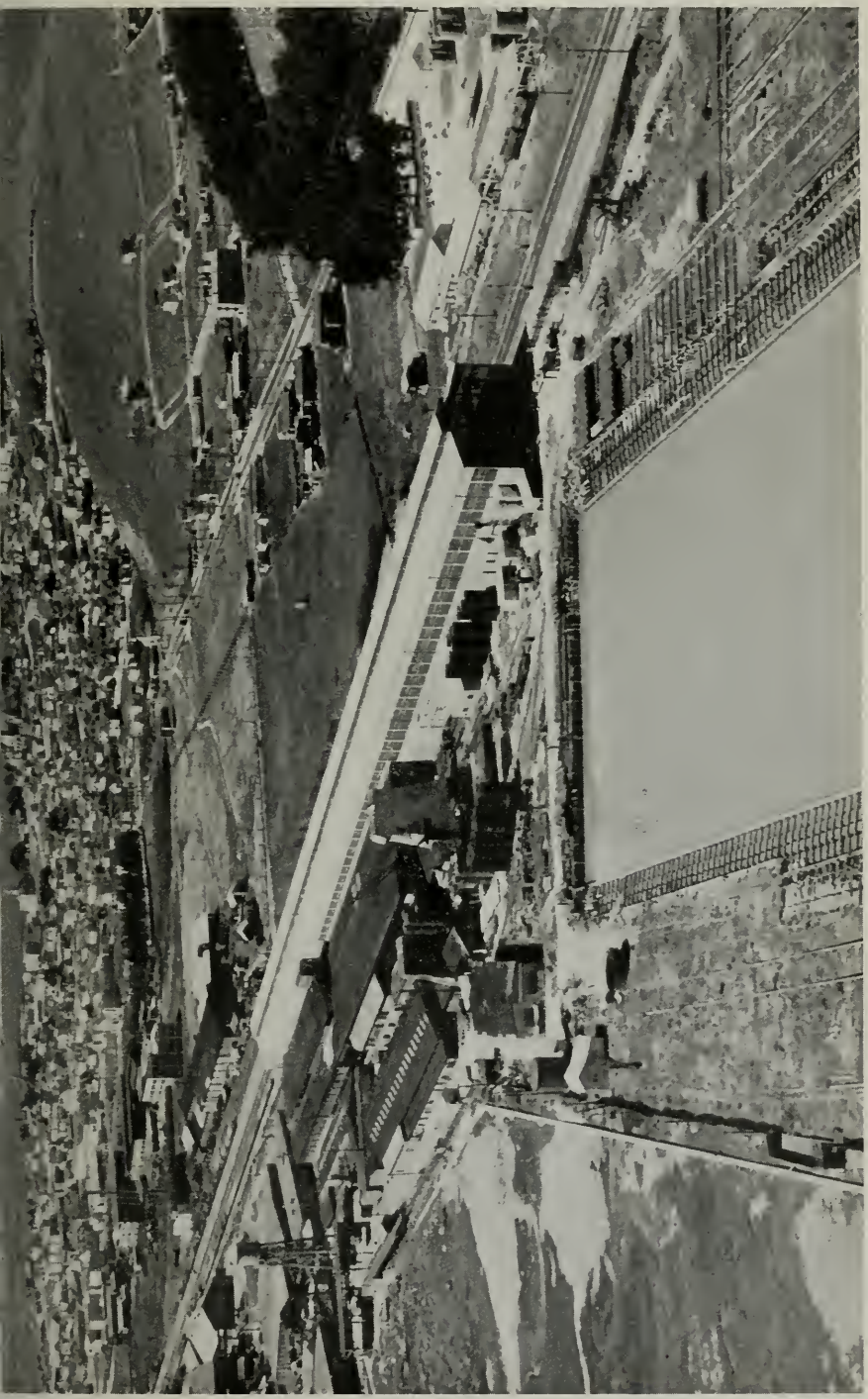
R. D. PLAGEMAN

Robert D. Plageman is a native of San Francisco. He has been associated vith Western Pipe and Steel Company since 1912. His activities run from journeyman in the plants of the company to Vice-President and Sales Manager of the San Francisco division, embracing all territory from San Francisco to Seattle, as well as the Hawaiian Islands and the Orient.

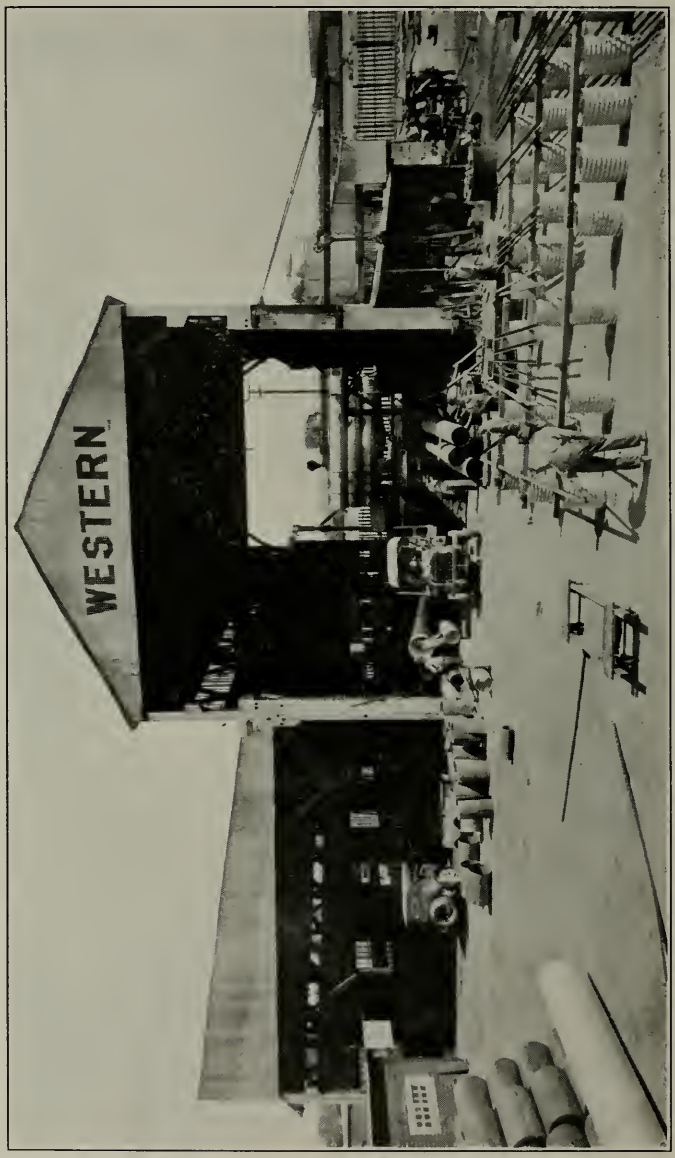
Mr. Plageman has charge of relations between the company and all contractors having to do with the installation of products fabricated by the ompany.

In 1919 the company sent Mr. Plageman to the Orient, where he spent ome time. Eight years later, in 1927, he was sent to Europe, where he assed several months. He studied manufacturing methods in Germany, Poland, France and England. As a result of his visits to the Far East and o European countries, Mr. Plageman has acquired a broad experience bearing on the business of the company.

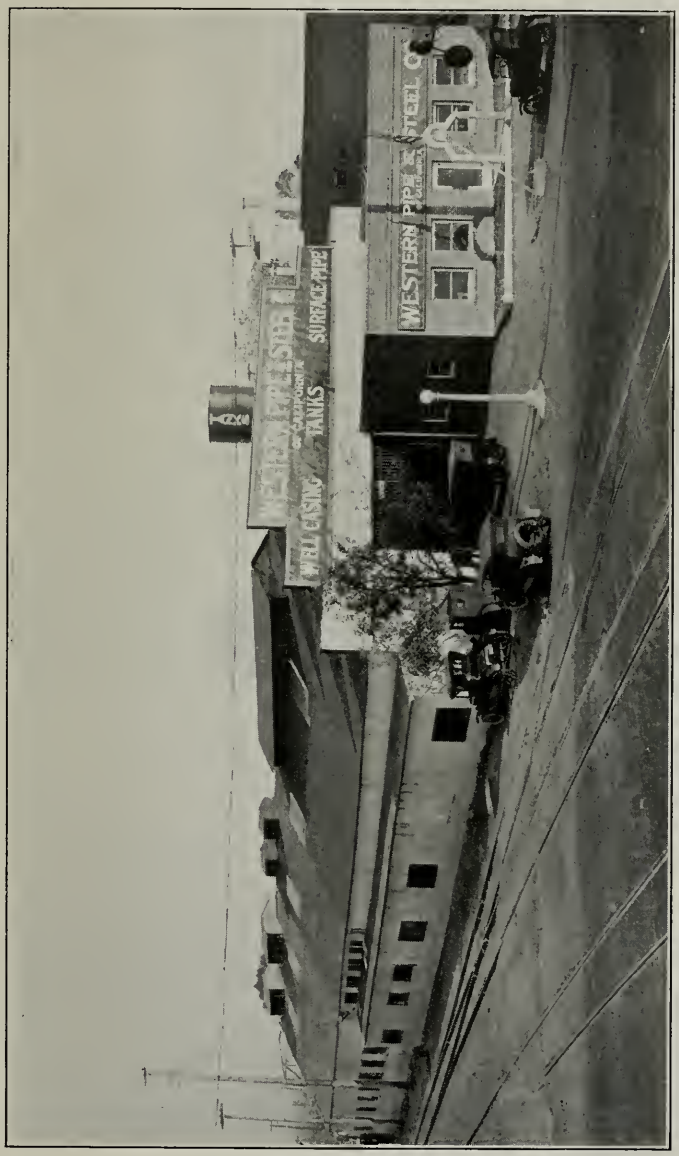
WESTERN
PIPE & STEEL CO. OF



Airplane view of South San Francisco plant, Western Pipe and Steel Company.



A portion of the Phoenix, Arizona plant, which specializes in well-casing, galvanized corrugated culverts, steel water pipe, storage tanks of all kinds, irrigation gates, and general sheet and plate work.



This is the Fresno plant, which supplies the San Joaquin Valley with water well-casing, galvanized tanks, wagon tanks, smoke stacks, black welded tanks and general sheet jobbing work.

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY
of California
444 MARKET STREET, SAN FRANCISCO
5717 SANTA FE AVENUE, LOS ANGELES
EDITED BY RICHARD PROSSER

IT WILL be noted by the many readers of WESTERN PIPE AND STEEL NEWS, that this issue departs from the customary subject matter of the magazine.

This publication exists primarily for the purpose of conveying information and giving illustrations regarding the products fabricated in our five plants, together with articles by eminent engineers discussing projects for which our products have been supplied.

Because of the fact that this number announces a new policy under which employees of the company and investors have acquired stock in the company, it seemed fitting to publish a statement regarding the changed policy.

We are also presenting to our readers a brief historical outline tracing the development of Wester Pipe and Steel Company of Califor nia from its beginning down to th present time. Included also are pic tures of the executive officers of th company, together with a short bio graphical sketch outlining their pa activities.

We quote the following interes ing excerpts from a statement issue by a prominent investment bankin house in connection with our ne policy of stock ownership:

"Listing of this stock for tradin on the San Francisco and Los An geles Stock Exchanges, focuses a tention on the position of this su cessful California corporation, large manufacturer in its line on the Pa cific coast.

"Its customers number practical all of the oil companies, public util ties, cement companies and munic palities in the West.

"Enterprise, vision, and adaptabi ity to meet and capitalize changin conditions in the industrial develo ment of the West have marked th management, which has further bee noted for maintaining a policy high integrity in its dealings."

Some Comparative Figures

To illustrate the growth of Western Pipe and Steel Company of California, we have abstracted figures showing the average yearly sales volume during the first five years after the company was incorporated, and also the average yearly sales for the last five years.

During the first five years annual sales averaged $1,131,850.

During the last five years annual sales averaged $7,385,000.

Western Pipe & Steel Company of California

Designers, Fabricators and Erectors of

STEEL PRODUCTS

Oil Storage Tanks
Bolted Tanks
Galvanized Tanks
Special Tanks
Gas Holders
Oil Accessories
General Plate Work
Pressed Steel Products

Riveted Steel Pipe
Penstocks and Syphons
Lock-Bar Steel Pipe
Welded Steel Pipe
Slip-Joint Steel Pipe
Water Well Casing
Metal Culvert Pipe
Special Galvanized Products

Structural Steel

GENERAL OFFICES

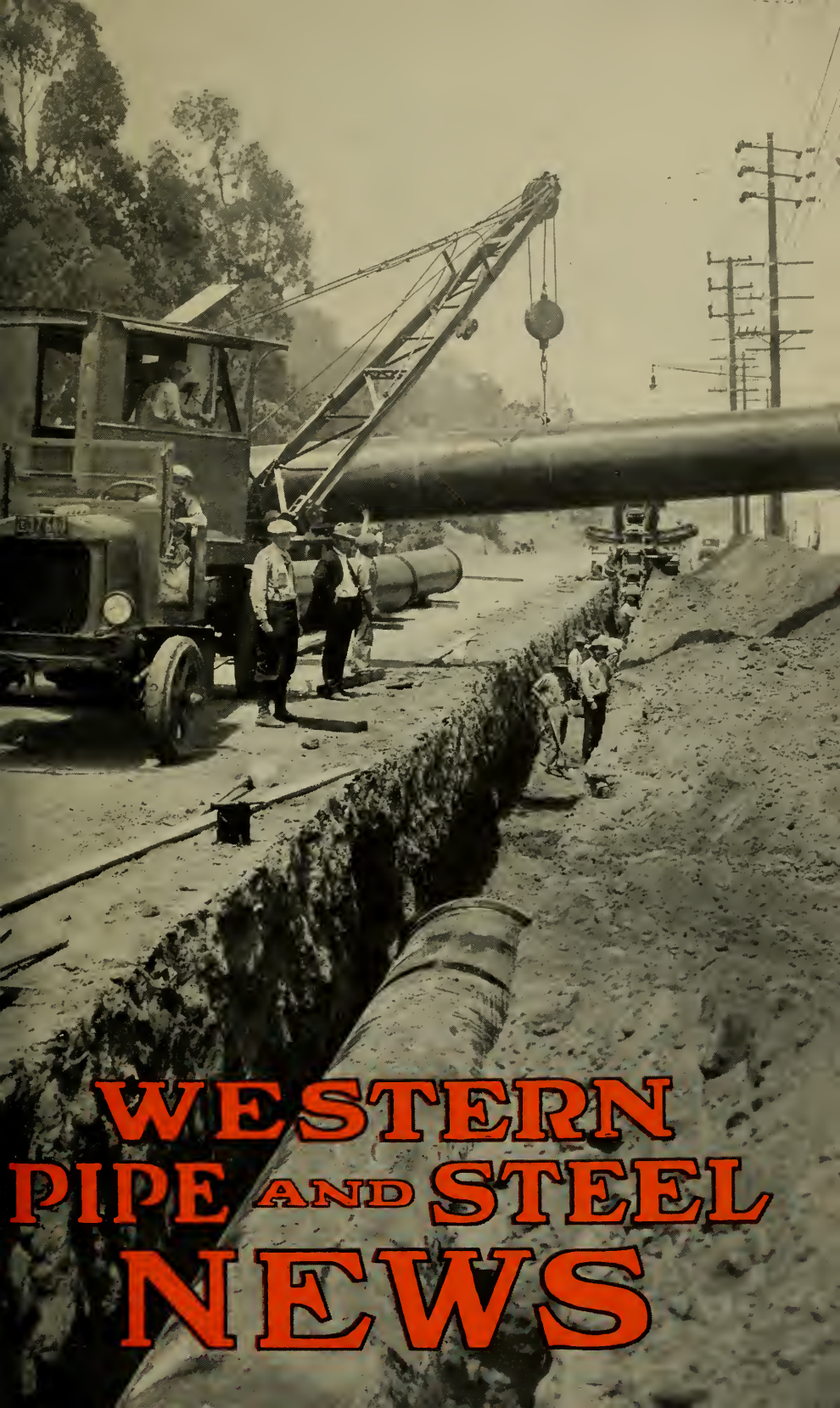
444 Market Street, San Francisco 5717 Santa Fe Avenue, Los Angeles

BRANCH OFFICES

Fresno, Bakersfield, and Taft, California, and Phoenix, Arizona

FACTORIES

South San Francisco, Los Angeles, Fresno, Taft and Phoenix
U. S. A.



WESTERN PIPE AND STEEL NEWS

WELDED STEEL WATER PIPE WITH BELL AND SPIGOT ENDS.—*This close-up taken at our Los Angeles plant, shows 40" diameter by 5/16" electrically welded steel water pipe fabricated for the Bureau of Water and Power, City of Los Angeles. The new line connects with the Elysian Park reservoir at Riverside Drive.*

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI AUGUST, 1929 (REGULAR) NUMBER 5

Automatic Electric Welded 40" Steel Trunk Line for the City of Los Angeles

By W. W. Hurlbut, Engineer of Water Distribution,
Department of Water and Power,
City of Los Angeles.

Until recently the main supply for the high gravity reservoir in Elysian Park, Los Angeles, was a 30-inch diameter, No. 12-gauge riveted steel pipe line installed about 21 years ago on the hillside south of Riverside Drive, and adjacent to the Crystal Springs conduit. This riveted steel pipe line was installed originally as a gravity line from the settling basin to the reservoir, but in 1920 a booster pump was installed to add 20 feet of head to this line.

W. W. Hurlbut

With the improvement of Riverside Drive between Los Feliz Road and the Dayton Avenue bridge, the Chief Engineer of the Department of Water and Power decided to replace the booster pump and the 30-inch riveted steel pipe line from Fletcher Drive to the Dayton Avenue bridge with a 40-inch steel main.

The new pipe installed consisted of approximately 9600 feet of 40-inch diameter by 5/16-inch thick bell and spigot electric welded steel pipe in lengths of about 24 feet. This pipe was fabricated at the Los Angeles plant of the Western Pipe and Steel Company of California. It was delivered by truck to the trench and then installed by experienced crews of the Department of Water and Power.

Each length of pipe was made up of two half circle plates 24 feet long, butt welded longitudinally inside and outside, with an automatic electric welding machine. There were no round seams in any section of the pipe. The bells were made ¾ inch thick and to a true circle, in order to avoid cracks in the cement joints after the pipe was put under pressure, and were attached to the pipe with an electric weld. The accompanying illustrations show the details of the type of bell and spigot as well as the method of installation.

After each section was welded in the shop, it was placed in a hydraulic

testing machine and subjected to an internal hydrostatic pressure of 200 pounds per square inch. While under this pressure the pipe was struck along the weld with an 8-pound sledge hammer to determine whether any defects existed in the welded seam.

Following this test, the pipe was given a double coat of asphaltum in a bath of hot asphaltum maintained at a temperature of about 350° F. After this process, the pipe was ready for delivery to the job.

The first 2500 feet of pipe was installed in March from Knox to Gail Streets on Riverside Drive. Joints were made of Portland cement mortar, composed of neat cement with 17% of water by weight, and caulked with iron and hammer.

All joints were painted with a pipe dip to keep from drying out, and then plastered with neat cement mortar on the inside of the pipe. The trench was backfilled to the full depth without watering, close up behind the laying crew. A valve was installed, shut and blocked at Gail Street, the other end at Knox Street was connected to the riveted steel pipe which was plugged at its far end.

When the water pressure was turned into the pipe several leaks showed up at the ground surface in a short time. All of the leaks were at the top of the bell and spigot joints, and most of them were due to the backfill as subsequent operations proved.

The final 7000 feet of the 40-inch by 5/16-inch bell and spigot electric welded steel pipe was installed by hand, tamping the backfill under the two lower quarters of the pipe, an covering the pipe with about a foo of loose dirt. All of the spigots wer driven well home into the bells an held firmly in place by three or fou lead wedges.

The cement joints were made onl in the cool of the morning and imme diately painted and covered. Back filling and watering was complete after water pressure was in the pip Small angles were easily made in th bell and spigot by trimming the ex cess length of the spigot with a acetylene torch. Larger angles wer made by cutting and welding in th usual way.

A hoist on a truck picked up th pipe from the trench side, and low ered it into place, drove home th previous length and entered it.

The saving in cost of installing thi 40-inch bell and spigot electric welde steel pipe over that of 40-inch rivete steel pipe was about $1.00 per foo according to preliminary cost state ments.

The ability of obtaining long sec tions of this pipe reduced the num ber of field joints to a minimum, an consequently the installation cos This represents a very economic proposition.

In this new trunk line, the City o Los Angeles has a water main o the highest quality both as regard economic service and future pe manency.

This pipe line was designed b Mr. W. W. Hurlbut, Engineer o Water Distribution, and Mr. Thoma Brooks, Superintendent of Distrib tion Construction, was in direc charge of the construction work.

The foreman in charge of this pipe line installation, who is standing beside the crane, has supervised the laying of many miles of steel pipe for the City of Los Angeles. He told our staff photographer that this bell and spigot steel pipe handles so easily that it was a pleasure to work with it.

INSTALLING AUTOMATIC ELECTRIC WELDED 40" STEEL TRUNK LINE F
three operations within the space of one block. The pipe in the trench in the foregroun
excavating the ditch just ahead of the pipe laying crew. Backfilling operations have been
pipe laying methods.

LOS ANGELES.—*Looking up Riverside Drive along Elysian Park, this picture shows* yond, *pipe laying operations are going on. In the background the trench digger is* the point *where pipe is seen in the foreground. This illustrates the efficiency of modern*

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY
of California
444 MARKET STREET, SAN FRANCISCO
5717 SANTA FE AVENUE, LOS ANGELES
EDITED BY RICHARD PROSSER

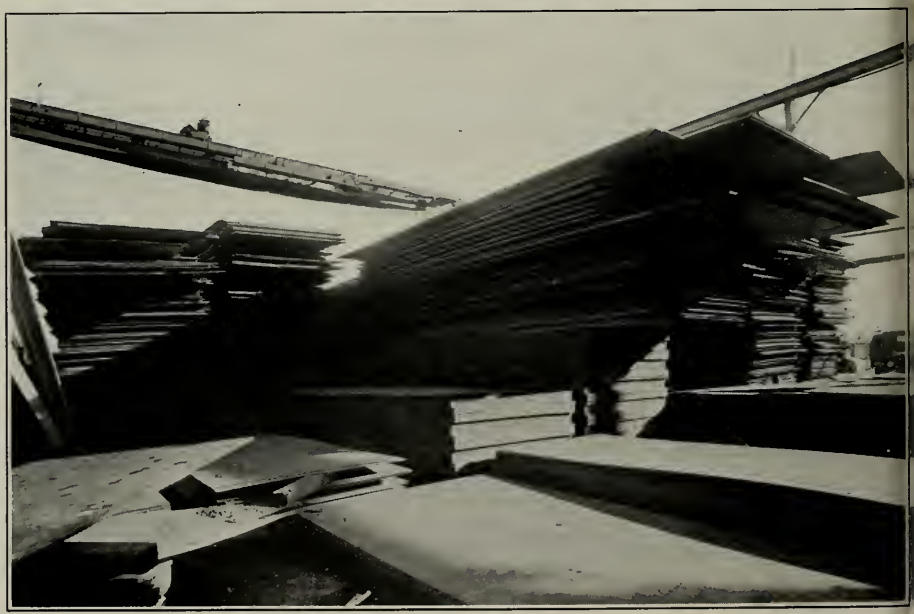
ON MANY occasions since WESTERN PIPE AND STEEL NEWS was established some five and a half years ago, we have had the pleasure of presenting articles and illustrations concerning steel pipe lines and other work fabricated for the City of Los Angeles. In this issue we print an article by Mr. W. W. Hurlbut, Engineer of Water Distribution, Department of Water and Power. His article, which is illustrated with pictures taken as the work progressed, is of unusual interest in that it discusses a type of steel pipe construction that is somewhat of an innovation in this part of the country.

That bell and spigot steel pipe makes for great economy in installation is evidenced by the fact that Mr. Hurlbut states that because steel pipe with bell and spigot was obtainable in 24′ lengths, thus reducing the number of field joints to a minimum, and because of other factors the preliminary cost estimate showed a saving of about $1.00 per foot.

As Mr. Hurlbut tersely says: "This represents a very economical proposition. In this new trunk line, the City of Los Angeles has a water main of the highest quality both as regards economical service and permanency."

The Cover Picture

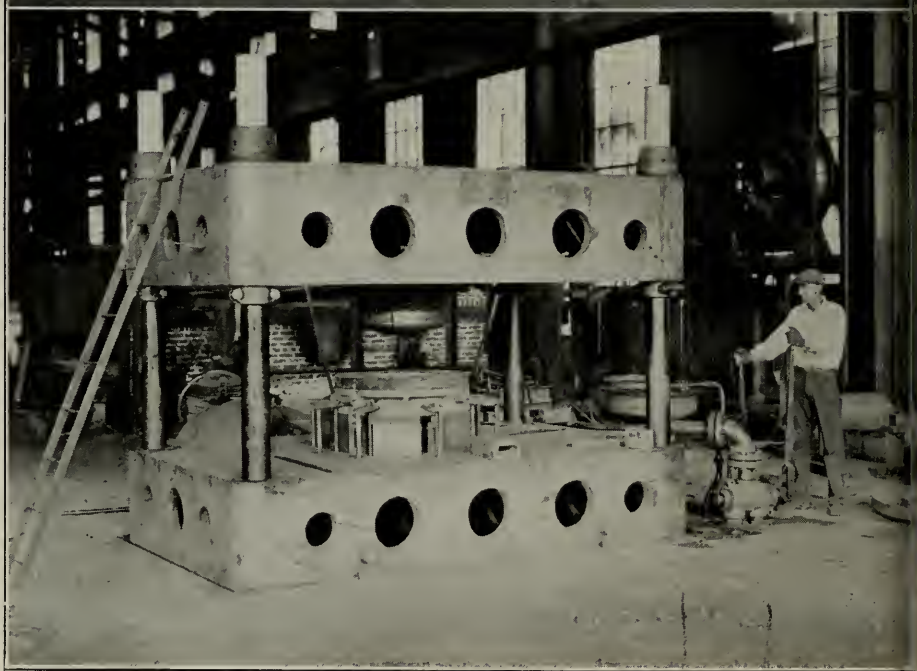
THE picture on the cover of this issue of WESTERN PIPE AND STEEL NEWS was taken on Riverside Drive, Los Angeles, during the installation of a new 40″ automatic electric welded steel trunk line. The pipe, which was bell and spigot construction, was fabricated at the Los Angeles plant of Western Pipe and Steel Company of California.



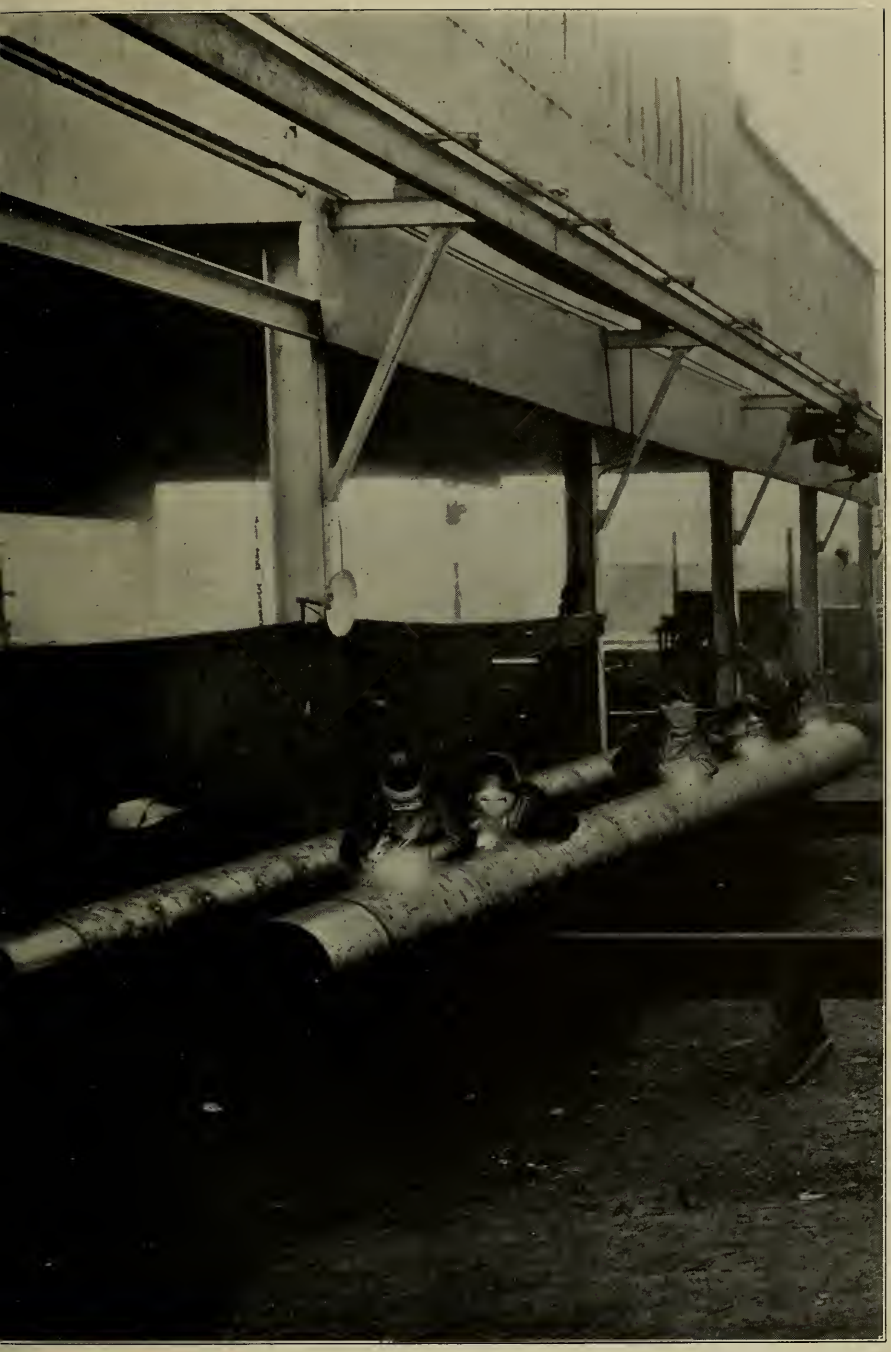
This picture, taken at our Los Angeles plant, explains one phase of our reputation for prompt deliveries. Large stocks of steel plates and sheets are carried at all times. Facilities, organization, and experience do the rest.

Unloading 24′ sections of the 40″ bell and spigot steel pipe along Riverside Drive for the City of Los Angeles' new pipe line.

Looking down into the trench at installation of bell and spigot steel water pipe. Note joint and also gate valve where line has been tapped.



The two pictures above show the pressed steel department of our Los Angeles plant. Above is a general view, with a wide variety of special products on the ground. Below is a close-up of the huge hydraulic press.



IL WELL CASING IS AN IMPORTANT PRODUCT OF OUR LOS ANGELES
'LANT.—*Known to the Oil industry as "Stovepipe Casing," this Western Pipe and Steel roduct is famous in every oil field in the West. For quality of material and workmanship it is recognized as unsurpassed. We use only Hard Red Steel in its manufacture.*

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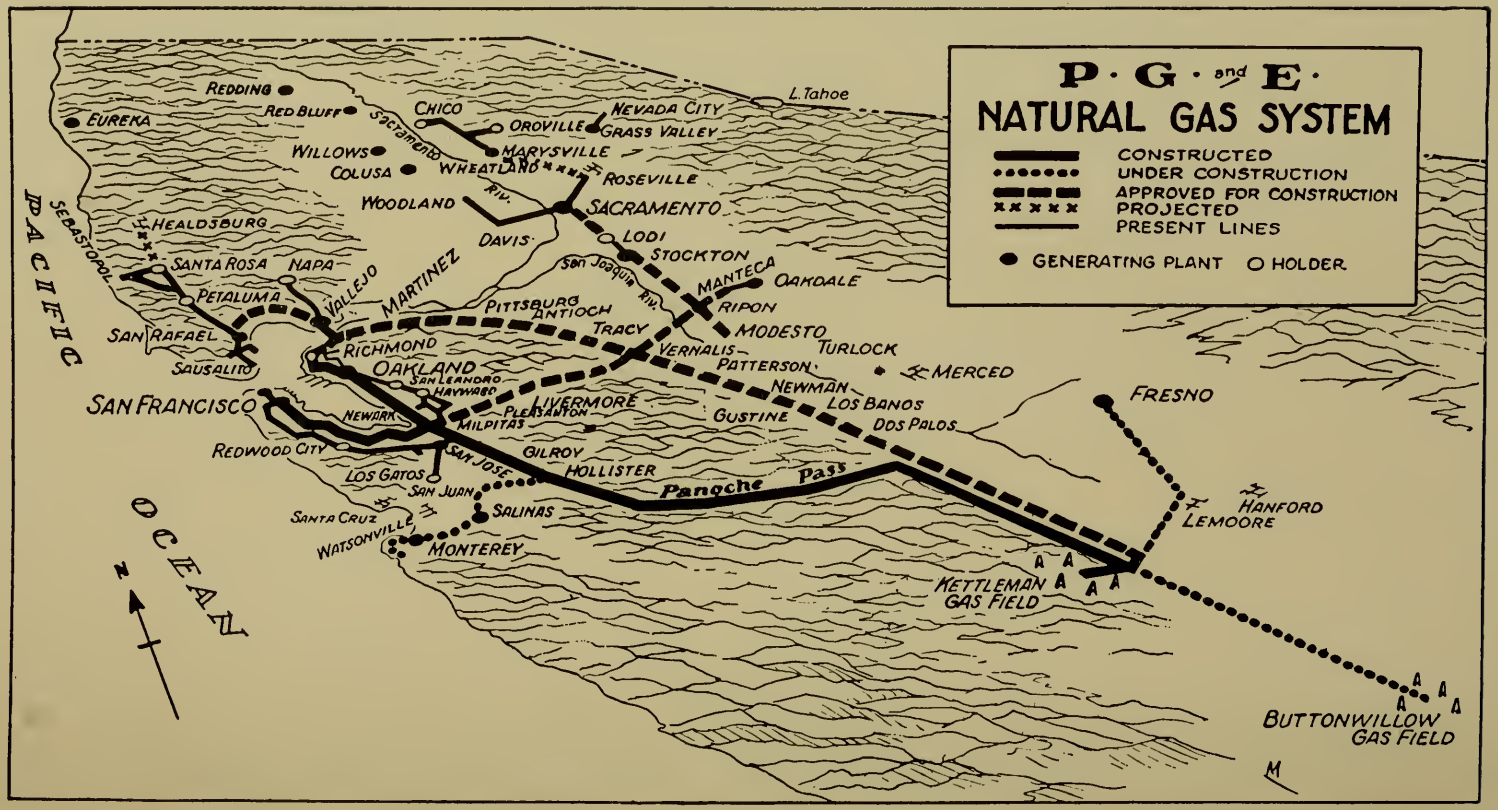
In This Issue:

fic Gas and Electric Co.'s
Natural Gas Pipe Line

WESTERN PIPE AND STEEL NEWS


P·G·and E·
NATURAL GAS SYSTEM
CONSTRUCTED
UNDER CONSTRUCTION
APPROVED FOR CONSTRUCTION
PROJECTED
PRESENT LINES
GENERATING PLANT
HOLDER
L. Tahoe
REDDING
RED BLUFF
EUREKA
CHICO
OROVILLE
NEVADA CITY
GRASS VALLEY
MARYSVILLE
WILLOWS
COLUSA
WHEATLAND
ROSEVILLE
Sacramento Riv.
WOODLAND
SACRAMENTO
DAVIS
LODI
STOCKTON
San Joaquin Riv.
MANTECA
OAKDALE
RIPON
MODESTO
TURLOCK
MERCED
HEALDSBURG
SEBASTOPOL
SANTA ROSA
NAPA
PETALUMA
VALLEJO
MARTINEZ
PITTSBURG
ANTIOCH
TRACY
VERNALIS
PATTERSON
NEWMAN
LOS BANOS
DOS PALOS
GUSTINE
SAN RAFAEL
SAUSALITO
RICHMOND
OAKLAND
SAN LEANDRO
HAYWARD
LIVERMORE
PLEASANTON
MILPITAS
NEWARK
SAN FRANCISCO
REDWOOD CITY
SAN JOSE
GILROY
HOLLISTER
Pancho Pass
LOS GATOS
SAN JUAN
SALINAS
SANTA CRUZ
WATSONVILLE
MONTEREY
FRESNO
HANFORD
LEMOORE
KETTLEMAN GAS FIELD
BUTTONWILLOW GAS FIELD
PACIFIC
OCEAN
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Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO · LOS ANGELES · FRESNO · TAFT · PHOENIX

VOLUME VI | SEPTEMBER, 1929 | NUMBER 6

Pacific Gas and Electric Company Brings Natural Gas to San Francisco Bay Region

By WILLIS S. YARD

Vice-President in Charge of Gas Construction and Operation.

NATURAL gas from the oil fields of Kettleman Hills, about 200 miles southeast of San Francisco, was brought to the bay area through Pacific Gas and Electric Company's new 20-inch welded steel pipe line, n August 16, and its use by consumers in a "reformed" mixture with arti-cial gas has been going on since that date. There are approximately 245 iiles of pipe line for the transmission of natural gas in operation at the resent time. In addition to this, we are now constructing 55 miles of 16-ich diameter welded steel pipe from the Kettleman Hills compressor tation to Buttonwillow. The completion of this extension about Novem-er 1st will enable us to draw natural gas from two independent sources of upply.

At the present time the pipe line from Kettleman Hills to Oakland and an Francisco is handling about 50,000,000 cubic feet of natural gas per ay. This volume can be increased to 65,000,000 or 70,000,000 cubic feet ithout using the booster station. However, a booster station is to be onstructed between Kettleman Hills and San Jose at some future time and his will give the line an ultimate capacity of at least 125,000,000 cubic feet er day.

We are constructing also a compressor station at Kettleman Hills which e expect to have completed early in November. The object of this installa-ion is to maintain the initial pressure in case the pressure at the wells hould fall. The pressure at the wells is 400 pounds per square inch. At his pressure, which is insured by the Kettleman Hills compressor station, t is unlikely that the booster station will be needed until the demand grows o the point where we will need the full capacity of the line, 125,000,000 ubic feet per day.

As another extension of the natural gas transmission line we are con-tructing a forty-mile branch from Hollister via Salinas to Monterey. This ine, which consists of pipe of 12-inch and 8-inch diameter, will be completed arly in November.

Natural gas is no new commodity to California. As far back as the '60's

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Editor's Note: **Western Pipe and Steel Company of California fabricated at its South San Fran-cisco plant a little over 37 miles of 20-inch welded steel pipe for the Pacific Gas and Electric Company's transmission line described in Mr. Yard's article.**

natural gas was distributed to the people of Stockton from a plant located in that city. The city of Sacramento, too, has had natural gas since the early days. But it was not until comparatively recent years that the activities of the California oil fields, particularly in Ventura and Kern Counties, began to liberate natural gas in enormous quantities that the practicability of conserving this and at the same time turning it to commercial account, involving its transportation over long distances to the large centers of population in the state, engaged the earnest attention of gas engineers.

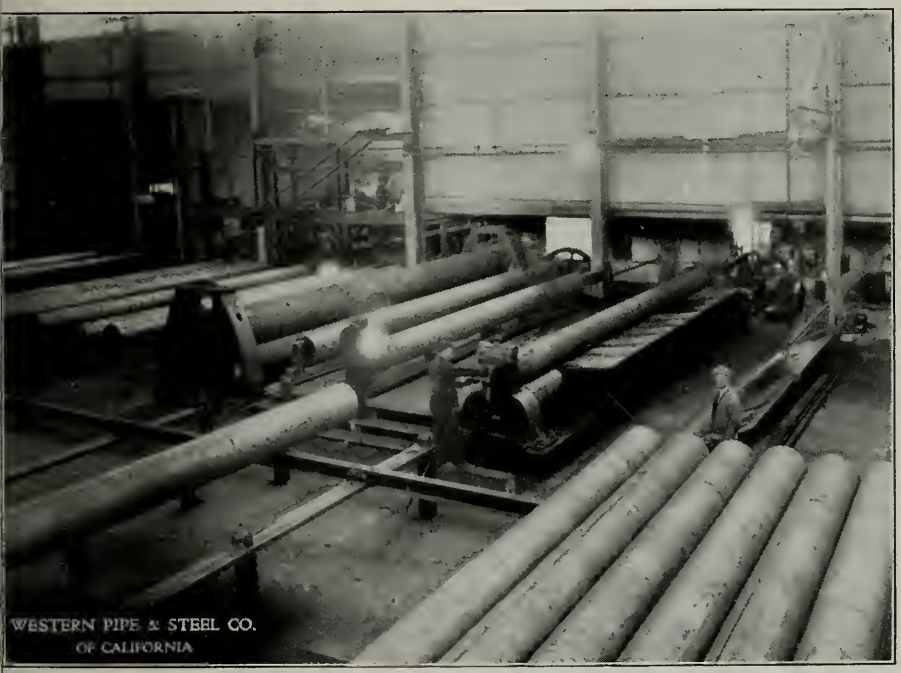
About two years ago a new gas field was discovered in the area known as Buttonwillow, about 35 miles west of Bakersfield and 247 miles from San Francisco. A number of gas wells were completed showing more than a thousand pounds pressure and each well capable of delivering five to ten million cubic feet of gas per day. A test well about 5 miles northwest of Buttonwillow, in the location known as Kettleman Hills, showed very high gas pressures, as did other wells in the San Joaquin Valley. About a year ago estimates were prepared and preliminary surveys and studies made for the location of pipe line and gas available for transporting to San Francisco and Oakland. These investigations were carried on until a satisfactory plan had been developed and a sufficient gas supply assured. Surveyors and right-of-way men were placed in the field, six miles of 20-inch pipe was ordered the first week in December last, and two weeks later this pipe was being laid in the new Bayshore highway from the Potrero Gas Works, south towards South San Francisco.

Early in January this year orders were placed for a total of 282 miles of

View of heavy plate shop at Western Pipe and Steel Company's South San Francisco plant where 37 miles of the Pacific Gas and Electric Company's pipe line was fabricated.

:eel pipe to be laid from Buttonwil-
ɔw to San Francisco and Oakland.
The main transmission line starts
: the gas wells in the Buttonwillow
as field where seven wells have
een completed and standing ready
ɔ deliver gas at 400 pounds pressure
s soon as the pipe line is completed.
his gas main is 16 inches in di-
neter and extends northwesterly
3 miles to a point near the northern
nd of the Kettleman Hills. The nec-
ssary connections were provided
nd a 22-inch diameter steel main
id northwesterly a distance of 41
iles to a point southwest of Men-
ɔta. There the line branches into
vo 20-inch lines, provision being
ade at some later date to extend
ne 20-inch line to serve points north.
Ve completed early in August the
)-inch line northwesterly through
anoche Pass to Tres Pinos, Hollis-
r, Gilroy, San Jose and terminating
: Milpitas, a total distance of 203 miles from Buttonwillow. At Milpitas metering stations have been installed and a 20-inch line laid northwesterly a distance of 44 miles to the Potrero Gas plant in San Francisco. A second 20-inch line was laid northeasterly to the Oakland Gas Works at the foot of Market Street, Oakland, a distance of 35 miles, making a total of 282 miles of natural gas transmission pipe line.

Special care was taken to protect the pipe lines against corrosion, due to bad soil conditions. Some sections of the line are covered with two layers of protective paper in addition to the regular asphaltum paint. Special welding inspectors were employed to supervise all welding operations and we believe that the welding job is as near perfect as it is possible to obtain, as no leaks of any consequence developed upon placing the line in operation. Valves have been placed in the line at five-mile intervals in



Rolling plates at the South San Francisco plant for Pacific Gas and Electric Company's pipe line. 6,600 tons of steel plates were used.

the valley sections and at two-mile intervals through the mountains. Special valves have been installed where any particular hazard is thought to exist.

This system is designed to take gas at Buttonwillow and Kettleman Hills and deliver 65,000,000 cubic feet per day at the terminals. By installing the necessary booster stations, this delivery can be doubled. The cost of this transmission system will approximate $11,300,000. Other changes made necessary by the introduction of natural gas required an expenditure of $1,750,000, making an over-all expenditure for this natural gas project of $13,000,000.

The gas being produced in the Buttonwillow field is a dry gas; that is, it contains no gasoline and has a heating value of approximately 1,050 British thermal units per cubic foot. The gas in the Kettleman Hills area contains a large quantity of gasolin and is called a wet gas. It is neces sary to remove the gasoline from th natural gas before turning the ga into the pipe line. In order to sav the gasoline, the oil producers insta absorption plants for removing th gasoline and deliver the natural ga to the pipe line practically free of i The gas from the Kettleman Hill wells, after having the gasoline re moved, will average between 1,20 and 1,250 British thermal units pe cubic foot in heating value.

At the present time natural gas i being sold to industrial plants locate near the main transmission line an the Pacific Gas and Electric Com pany is using 30,000,000 cubic fee per day in its gas operations and a boiler fuel in its steam electric ger erating plants at Station "A," Sa Francisco, and at Station "C," Oak land. The construction program i

Welded steel pipe undergoing hydrostatic test of 500 pounds per square inch. Every pipe section had to pass this test.

ne gas plants has been co-ordinated ith the pipe line schedule, so that ithin one hour after the gas had een received in San Francisco it was eing used in the manufacture of gas r distribution to domestic consum-rs. A few hours later gas was being sed to replace oil in electric generat-ng Station "A." Within two days fter the arrival of the natural gas, 0 per cent of the gas supplied the ay area was being manufactured rom the natural gas, which had re-laced oil in the generators. Many ontracts are being signed by indus-rial gas consumers and as soon as roper connections can be made to upply these plants, service will be endered.

An eight million cubic foot holder n Oakland and a ten million cubic oot holder in San Francisco will be ompleted early in November. These olders will be used for the storage f natural gas and assure supply to the consumers to be served natural gas at this time. The gas storage capacity of the entire Bay area would not be sufficient to guarantee straight natural gas service at this time to San Francisco and Oakland in the event of a line break or interruption in gas supply which would require more than 24 hours to repair. For that reason it seems advisable to carry out the program as outlined above.

It was mentioned earlier in this article that the completion of the gas line from Kettleman Hills to Milpitas was the first step in the Pacific Gas and Electric Company's program to serve natural gas to central and northern California. The next step is the proposal to build another large transmission line to be known as the Valley line, starting at the Kettleman compressor plant and extending north by the way of Tracy,

Continued on Page Nine

Looking down heavy plate shop during the fabrication of 37 miles of steel pipe for Pacific Gas and Electric Company.

THESE PILES CONTAIN SEVERAL MILES OF STEEL PIPE FOR PACIFIC GAS AND
TRIC COMPANY.—*This picture, taken at Western Pipe and Steel Company's South San Fr*
plant, shows double piles of pipe, with heavy plate shop in the background. The pile at the left

high, is the pipe as it came from the plant. At the right is shown pipe after wrapping has been Western Pipe and Steel Company manufactured 37 miles of this 20-inch welded steel pipe fic Gas and Electric Company's new natural gas line to supply the San Francisco Bay area.

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WE TAKE pleasure in presenting in this issue an article by Willis S. Yard, vice-president of the Pacific Gas and Electric Company in charge of gas construction and operation. Mr. Yard's article deals with the natural gas line from Buttonwillow and Kettleman Hills to San Francisco, Oakland, and other points in the bay region.

The shop pictures used to illustrate this number were taken at our South San Francisco plant during the fabrication of the pipe, and the field pictures were taken during the installation of the 37 miles of the line which Western Pipe and Steel Company of California supplied. Most of the pipe manufactured by this company was laid between Milpitas and Oakland. Approximately 6,600 tons of steel plates were used in the manufacture of the 37 miles of pipe. There were 185,664 feet of automatic electric welded steel pipe 20 inches in diameter, made of 5/16-inch plate, and 9,720 feet of the same diameter made of 1/4-inch plate.

It will be noted that Mr. Yard makes the following comment in his article, speaking, of course, of the entire line including the portion manufactured by ourselves:

"We believe that the welding job is as near perfect as it is possible to obtain, as no leaks of any consequence developed upon placing the line in operation."

We are very proud that our organization played a part in this significant development which has been so successfully carried out by the Pacific Gas and Electric Company.

Barges at Western Pipe and Steel Company's South San Francisco plant loading Pacific Gas and Electric Company's pipe for transportation by water.

Continued from Page Five

through Contra Costa County to Richmond; also, a branch line extending west from a point near Tracy through Livermore Valley to Milpitas, tying into the present natural gas system. In addition, a line will be laid east from the junction point near Tracy to supply Modesto and continue north to Stockton, Lodi and Sacramento. This will provide a complete loop system and an independent source of supply of natural gas from the fields to the San Francisco Bay area. At a future date, it is also planned to tap this line near Crockett and lay a transmission line across the Carquinez Bridge to Vallejo and by way of Black Point cutoff to the San Rafael-Petaluma transmission line. This will supply natural gas to practically all the cities and towns of northern and central California, and provide a market for the natural gas which will be produced in the development of the Kettleman Hills oil fields.

The Railroad Commission has granted a certificate of convenience and necessity for the construction of this proposed transmission system. Surveys are nearly completed, rights-of-way are being purchased and within a very short time construction work will be under way. Completion date is expected some time next spring and upon the placing of this project in operation the Pacific Gas and Electric Company feels that the proper safeguards have been taken to insure an uninterrupted supply of natural gas to the Bay area and will then be ready to supply natural gas to all consumers. The completion of the entire project as outlined, the Valley line and the present Buttonwillow-Milpitas system, will require the expenditure of approximately $26,000,000. Nearly 800 miles of natural gas transmission lines, in all, will be installed, with the necessary compressor plants and metering stations, making this one of the largest natural gas transmission systems in the United States and supplying service to over 500,000 domestic consumers.

The benefits of natural gas as a fuel for domestic and industrial purposes have long been recognized, but it has only been within the last year that a gas supply has been developed near enough to the Bay area to make possible the introduction of this ideal fuel into the Pacific Gas and Electric territory. The construction of this great natural gas transmission system permits the supplying of the entire market with this fuel in the areas near the pipe line system and provides an outlet for the gas from the oil fields. The conservation program of the Government and also the new California Gas Conservation law make it necessary to find a market for the gas which may be produced from oil wells, otherwise, the oil production will have to be closed in as the new law is designed to eliminate the wastage of gas. The market for natural gas in southern California was unable to use all of the gas being produced in oil field operations, with the result that great volumes of gas were being wasted. The new gas and oil developments in the Kettleman Hills had no outlet for their gas unless a new market was found and the Pacific Gas and Electric Company has provided this market by the construction of this great natural gas transmission system to the Bay area. Thus the introduction of natural gas to San Francisco and Oakland is not only of benefit to the gas consumers in this territory, but it also assists the oil industry in carrying on developments in the San Joaquin Valley.

Wrapping field joints along the line of the Pacific Gas and Electric Company's natural gas conduit near Milpitas.

Welders at work welding joints on Pacific Gas and Electric Company's natural gas line.

Placing sections of pipe over the trench for Pacific Gas and Electric Company's 245-mile pipe line.

This pipe line brings natural gas to the San Francisco Bay region from Kettleman Hills.

A long section of the line under pressure test. From 1000 to 2000 feet were tested at one time.

VIEW OF PACIFIC GAS AND ELECTRIC COMPANY'S GAS LINE NEAR ALVISO.—*This section is undergoing the first of two field tests, this being above ground and before field joints were wrapped. The second test was made after the pipe was placed in the trench and backfilled.*

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WESTERN PIPE AND STEEL NEWS

In This Issue:

Tenth Annual Convention

California Section

American Water Works Association

Hotel Del Monte, October 23-26

Brief Biographies of New Officers

A group of past and present officers of the California Section, American Water Works Association. (Left to right) JOHN S. BURT, *retiring president;* W. W. HURLBUT, W. F. GOBLE, CHARLES S. OLMSTED, GEORGE W. PRACY, *and* SAMUEL B. MORRIS.

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI OCTOBER, 1929 NUMBER 7

Tenth Annual Convention, American Water Works Association, California Section, An Outstanding Success

THE tenth annual convention of the California Section of the American Water Works Association, which was held at Del Monte from October 23 to October 26, will go into the annals of the organization as ne of the most successful of all its meetings. This was the consensus of pinion among water works engineers and superintendents, and also the anufacturers of water supply equipment who attended the convention as khibitors or as delegates.

Every section of California was represented and there were also present a umber of members of the national body from Oregon, Washington, Idaho, nd British Columbia as well as from Eastern states.

The registered attendance was a little over four hundred. This is the rgest registration in the history of the organization with the exception of vo years. The convention at San Francisco last year showed a registraon of six hundred and fifty, but this was undoubtedly largely due to the ct that the national convention was held at San Francisco at that time.

Pasadena was selected as the location for next year's convention, thus arrying out the association's policy of taking its sessions to different parts f the State from year to year.

The convention sessions at Del Monte were notable both for the wide ariety and the interesting presentation of papers on pertinent subjects. mong the outstanding addresses were those by F. W. Hanna on "The Iokelumne project of the East Bay Municipal Utility District"; Chas. S. lmstead on "The Monterey County Water Works"; and M. M. O'Shaughessy, city engineer of San Francisco, who spoke on "Some Problems of Ietch Hetchy and other Water Supplies."

Special credit for the success of the Del Monte convention is due to various ommittee heads and their tireless co-workers, who made both the business essions and the entertainment features of the gathering the most successful n record. The committee heads were as follows: Reception Committee, eo. W. Pracy; Ladies' Reception and Entertainment Committee, Mrs. harles S. Olmsted; Local Committee on Arrangements, Charles S. Olmted; Exhibits Committee, James R. Barker; Golf Committee, H. S. Kitredge; Entertainment Committee, Alexander Bell.

Chairman Olmsted of the Local Committee, who was ably assisted by harles S. Brown, W. R. Moon, and J. Beaumont, expressed his gratificaon at the success of the convention and his appreciation of the splendid pirit of co-operation manifested.

CHARLES S. OLMSTED of Del Monte was elected president of the California Section of American Water Works Association for 1929-30, at the tenth annual convention of the organization which was held at Hotel Del Monte, October 23 to 26. Mr. Olmstead is superintendent of the Monterey County Water Works. A native of Oakland, he first came to the Monterey Peninsula in 1884 and has been identified with the growth and development of the region practically ever since.

He has been connected with the Monterey County Water Works and the Del Monte Properties Company and their predecessors in ownership, the famous old Pacific Improvement Company, for the past thirty-two years, having entered their employ in 1897.

In 1911 Mr. Olmsted took over the management and operation of the Monterey County Water Works. Prior to that he was employed in the capacity of chief engineer.

CHARLES S. OLMSTED

The area served by the Monterey County Water Works includes Monterey, Pacific Grove, Carmel, and the intervening territory known as Pebble Beach and the Monterey Peninsula Country Club area. The development of the water works dates back to 1880 when the Hotel Del Monte was started.

The first water supply was taken from the Carmel river primarily to serve the hotel but when the pipe line was buil to Monterey it was decided to sell wate to residents of that community. By 190 population growth required the construc tion of an additional pipe line for a dis tance of 14 miles, the pipe being 2 inches in diameter. Again in 1920 it wa found that further storage was necessar and San Clemente dam was constructe in the Carmel Valley. This dam store 700 millions gallons of water. Th watershed covers a area of about 15 square miles, th greater portion o which lies in th Monterey division o the Santa Barbar National Forest Re serve.

Last year the con sumption of wate became so heavy tha it was found neces sary to install a new pipe line from th Clay Pits reservoi into the center of th distributing systen at Pacific Grove. Ac cordingly a 30-incl diameter weldec steel pipe line was laid and put int service in June of this year. This pipe i made up of ¼-inch steel plates. All sho joints were electrically welded and the dipped and soil-proofed. Field joint were also electrically welded. This pip was furnished by Western Pipe and Stee Company of California, and of it Mr Olmsted said: "We were very fortunat in the laying of this pipe, as when th water was turned into it we had but on leak."

WILLIAM W. HURLBUT, engineer in charge of Water Distribution and peration of the City of Los Angeles, as chosen vice-president of the Califor-a Section of the American Water Works ssociation at the Del Monte convention.

Mr. Hurlbut was born December 10, 379, at Cheyenne, Wyo., and moved to enver, Colo., in 1892 where he com-eted his common school education in e public schools. In 1896 he entered e School of Mines Colorado, trans-rring to the Uni-rsity of Califor-a in 1900, and to anford University 1902, finishing his gineering course 1903.

In 1904 he located Los Angeles, en-ging in general vil engineering actice until 1905, which time he be-me associated with L. Sonderegger d J. B. Lippin-tt on the Long each Harbor Sur-y. During 1905 d 1906 he was employed as Assistant ngineer of the Huntington Land & Im-ovement Company on surveys, and ter on special work with the Pacific lectric Railway. In the latter part of 906 he was with Allen Brothers, Con-lting Engineers in Pasadena, largely water works structures.

He qualified under Civil Service as aftsman and received his appointment December 20, 1907, with the Bureau the Los Angeles Aqueduct. In 1909 was promoted to chief draftsman, ving to do with the design and all other engineering matters passing through the engineering drafting room in connection with the Los Angeles Aqueduct.

WILLIAM W. HURLBUT

Upon the completion of the Aqueduct in June, 1913, he was transferred to the Water Department in the same capacity. In 1920 he was promoted to Office Engineer in charge of the general engineering offices of the Bureau of Water Works & Supply, and acted in this capacity as assistant to Chief Engineer Mulholland until December, 1928, when Mr. Van Norman, general Manager and Chief Engineer, designated Mr. Hurlbut as Engineer in charge of Water Distribution and Operation Division of the Department of Water & Power of the City of Los Angeles.

Mr. Hurlbut is a member of the American Society of Civil Engineers, a member of the American Water Works Association and vice-president of the California Section, a member of the Engineering Club of Los Angeles, the University Club, and of various civic organizations.

He has been connected with the water supply of the City of Los Angeles for 22 years, and during that time he has seen the population grow from 300,000 to 1,300,000, the area increase from 60 square miles to 441 square miles, this area being served in 1907 by 300 miles of pipe line and by 3400 miles of pipe line in 1929. There were 50,000 services in 1907 as compared with 235,000 today.

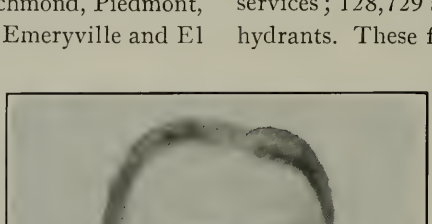
GROUP PICTURE OF DELEGATES, TENTH ANNUAL CONVENTION, CALIFO
SECTION, AMERICAN WATER WORKS ASSOCIATION, AT HOTEL DEL MON

This year's gathering, one of the most successful in the history of the organization, w

October 23 to October 26. The attendance was third highest since the formation of the California n ten years ago. Members from every part of California attended, and there was also a size-representation from Oregon, Washington, Idaho, British Columbia and Eastern states.

Louis L. Farrell, Superintendent of Construction and Operation of the East Bay Municipal Utility District, was chosen as Secretary-treasurer of the California Section of the American Water Works Association to serve for the 1929-30 period.

The East Bay Municipal Utility District comprises the cities of Oakland, Berkeley, Alameda, Richmond, Piedmont, Albany, San Leandro, Emeryville and El Cerrito. Mr. Farrell has been connected with this district and its predecessor water companies since February, 1906. During 1906 and 1907 he was with the engineering department of the Richmond and the Syndicate Water Companies. From 1907 to 1917 he was division superintendent of the Peoples Water Company in charge of Contra Costa communities.



LOUIS L. FARRELL

In 1917 Mr. Farrell was made superintendent of construction and operation for the entire system of the East Bay Water Co. and continued in that capacity until December 7, 1928. On the latter date he was appointed superintendent of construction and operation for the entire system of the East Bay Municipal Utility District.

Mr. Farrell was born at San Jose and attended Santa Clara University. He is a charter member of the California Section of the American Water Works Association, holds office as an official of th Boy Scouts of America, and is a mem ber of the American Military Engineers

The local system of the East Ba Municipal Utility District — propertie purchased from the East Bay Water Co. consists of 1403 miles of transmissio and distributing mains ranging in siz from 2-inch to 54-inch; 138,980 activ services; 128,729 active meters and 4,77 hydrants. These figures as of January 1 1929.

Headquarters o operation and main tenance for the sys tem are located a 22nd and Adelin streets, Oakland These quarters known as the Cor poration Yard, hous the offices of G. A Hunter, who ha charge of all build ing construction an maintenance of struc tures; L. J. Trave master mechanic in charge of pumping plants; J. S. Stevens yard superintendent in charge of garage, machine shops, meter shop and the distribution of material and supplies used over the entire system.

Also the office of the Superintendent of Construction and Maintenance, where an adequate office force, as well as a field force, consisting of about 400 men, are employed on construction and maintenance work covering the entire local system, with the exception of Richmond, where a small maintenance crew operates, reporting, however, to this office.

W. F. GOBLE

W. F. Goble of Alhambra was elected a member of the executive committee of the California Section f the American Water Works Association, at the Del Ionte convention. Mr. Goble has been superintendent f the San Gabriel Valley Water Company since 1911. 'rior to that he was with the Los Angeles City Railway ı the mechanical departments for fifteen years, and for ɔur years he was superintendent of the mechanical de-artment of the Los Angeles and Redondo Railway and ıe Redondo Water Company.

It may be mentioned in passing that Mr. Goble is a olf enthusiast and captured fifth prize in the annual olf tournament held on the Del Monte golf course)ctober 23.

The San Gabriel Valley Water Company previously erved the city of Alhambra, but that part of the system ɣas sold to the city in 1915. Since that time the system vhich they operate consists of the major portion of the city of San Marino, the Oak Knoll section of the city of Pasadena, a portion of the city of San Gabriel, the terri-ory lying between the north city limits of San Marino and the south city limits of Pasadena which is unincorporated, and the section known as the Rosemead district.

All of the water furnished by the San Gabriel Valley Water Company is produced rom deep wells, stored in distribution reservoirs of modern construction and deliv-red to its consumers through modern services which are equipped 100% with meters.

GEORGE W. TRAUGER

George W. Trauger, newly elected member of the Executive Committee of the California Section of the American Water Works Association, is Superintendent of the Lindsay-Strathmore Irrigation District, with which he has been connected for the past fourteen years. Prior to that he was engaged in private engineering work at Lindsay for seven years. Mr. Trauger has had a long and distinguished career in engineering. He started with the W. G. Wilkins Co., construction engineers, at Pittsburgh, Pa., and spent a year on surveys of the famous Thaw coal lands. He was for three years division engineer for the West Penn. Railway Co. at Uniontown, Pa. Subsequently he served as county surveyor of Polk County, Minnesota, with headquarters at Glenwood. He came to California from Minnesota.

The Lindsay-Strathmore Irrigation District in Tulare County comprises 15,000 acres of highly developed citrus lands and is one of the most modern rrigation systems known. The water is distributed through 100 miles of steel pipe lines under pressure. It may be of interest to note that the 100 miles of steel pipe used in the distributing system was furnished almost exclusively by Western Pipe and Steel Company of California. The pipe varies in size from 4″ to 36″ and is noted as being one of the earliest installa-tions on a large scale of steel pipe with soil proof wrapping.

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5717 SANTA FE AVENUE, LOS ANGELES
EDITED BY RICHARD PROSSER

FROM the time the California Section of the American Water Works Association was organized in 1920, Western Pipe and Steel Company of California has been an active participant in its conventions. It has been our pleasure and our privilege to send to each yearly gathering a goodly representation from our executive and sales forces and also to cooperate by installing a comprehensive exhibit of products of interest to water works men.

We are glad to participate in these yearly gatherings for two reasons: first, because conventions of this character are essentially of high educational value and mutual benefit to all concerned; and second, because it gives us an opportunity to display new products and manufacturing methods as well as standard articles.

It is obviously impossible for busy engineers and water works superintendents to visit our factories often enough to keep abreast of every new development. When there are hundreds of them gathered together as at these annual conventions, they have an opportunity to study the exhibits and to investigate unhurriedly those that are of particular interest. Some idea of the educational value of the convention sessions, particularly the symposia where all papers are followed by open discussion, may be gained from the topics brought up at Del Monte:

"Testing Water Meters and Accompanying Adjustments"; "Contamination of Water Systems by Consumers' Water Uses"; "What Is Adequate Pressure?"; "Meter Testing and Registration"; "Service Installation"; "Corrosion of Water Pipe"; "Sanitation"; "Commercial Problems", etc.

S. B. MORRIS

S. B. MORRIS, chief engineer of the Pasadena Water Department, was chosen National Director of the American Water Works Association, representing the California Section, to succeed George W. Pracy. Mr. Morris was graduated in civil engineering from Stanford University in 1911. He joined the North Pasadena Land and Water Company as engineer and later was affiliated with Allin Brothers, engineers, Pasadena. From January, 1912, to May, 1913, he was assistant engineer on valuation of private water companies, which resulted in the purchase by the City of Pasadena of the three larger water companies serving the city. In May, 1913, Mr. Morris was appointed chief engineer of the Pasadena Water Department.

Mr. Morris is a member of the American Water Works Association and was secretary-treasurer of the California Section for three years, 1922 to 1924, and vice-president in 1926. He was president of the California Section in 1927. He is a member of the American Society of Civil Engineers and served the Los Angeles Section as vice-president in 1924 and as president in 1925. He is a member of the Seismological Society of America, American Association for Advancement of Science, Engineers' Club of Los Angeles, and is a director of the California Municipal Utilities Association.

Officers
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American Water Works Association
1929-1930

Charles S. Olmsted, President.
Superintendent, Monterey County Water Works

William W. Hurlbut, Vice-President.
Engineer of Water Distribution and Operation,
Department of Water and Power,
Los Angeles, California

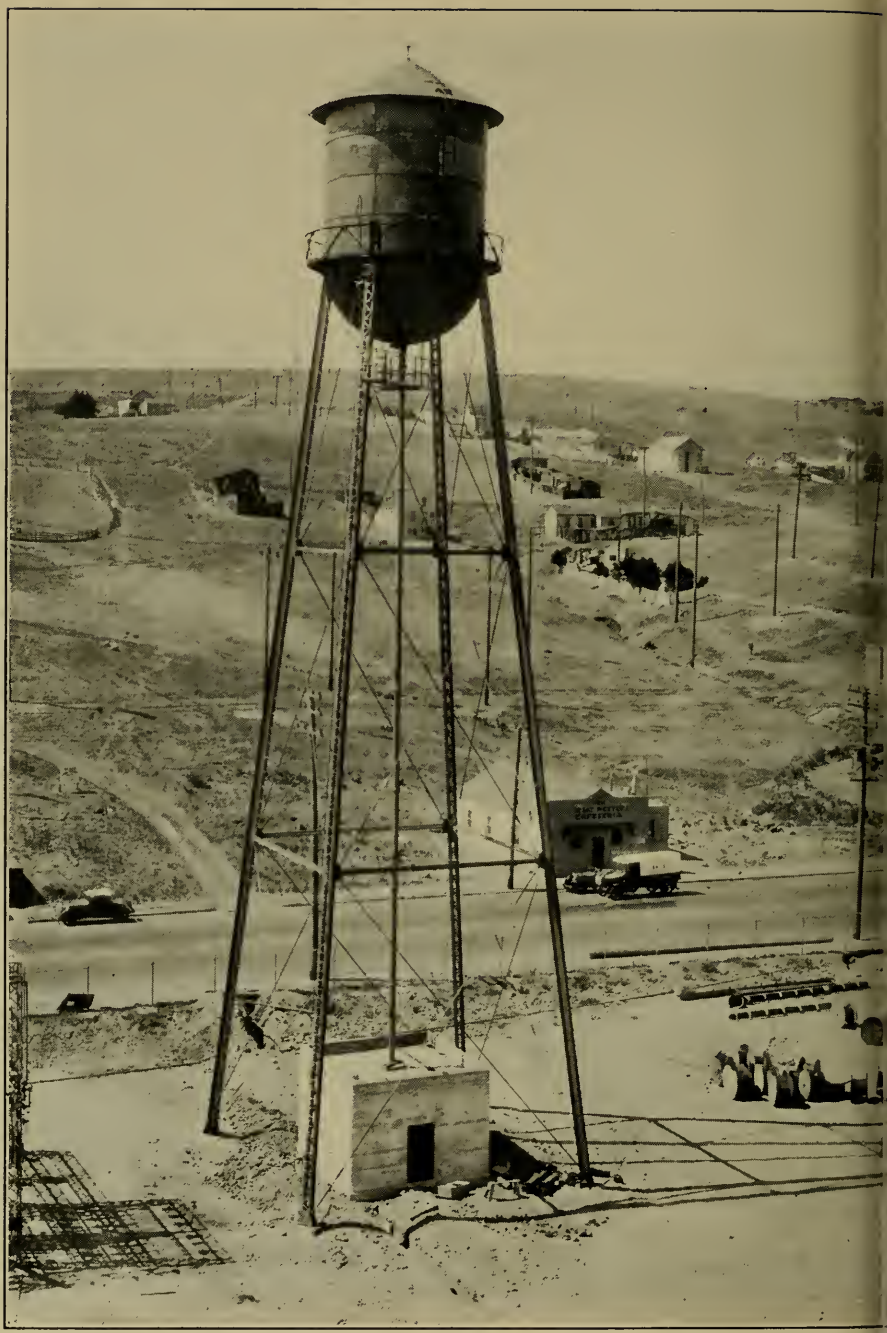
Louis L. Farrell, Secretary-Treasurer.
Superintendent of Construction and Operation,
East Bay Municipal Utility District

W. F. Goble, Executive Committee.
Superintendent, San Gabriel Water Co.,
Alhambra, California

George W. Trauger, Executive Committee.
Superintendent, Lindsay-Strathmore Irrigation District

Samuel B. Morris, National Director.
Chief Engineer, Water Department of Pasadena

WESTERN PIPE AND STEEL NEWS



WESTERN PIPE AND STEEL COMPANY FABRICATED AND ERECTED THIS HEMISPHERICAL BOTTOM TANK AND TOWER FOR GREAT WESTERN POWER COMPANY'S NEW SAN FRANCISCO STEAM PLANT.—*The tower is 100 feet high and the tank is 19 feet in diameter by 18 feet high and holds 50,000 gallons of water.*

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VI NOVEMBER, 1929 NUMBER 8

New San Francisco Steam Plant
Great Western Power Company of California

By Harold K. Fox, Construction Engineer

For the primary purpose of giving better service to its customers, Great Western Power Company of California has built in the City of San Francisco a new steam plant, located at Evans and Ingalls Streets.

It was rather a difficult problem to find a suitable site for a large steam lant as such a site should have a combination of very important advanages, among which are: Supply of salt water for condensing purposes; uitable foundation material; supply of fresh water; proximity to the load enter, and transportation facilities.

The company finally purchased several acres of land on the waterfront n the section of the city commonly known as "Butchertown." That porion of the property upon which the plant is located was a hill of serpentine ock and it was necessary to excavate 85,000 yards to prepare it. The maerial excavated was used to make two dikes, extending out into the bay o the government bulkhead line established for the future waterfront. Railroad facilities were not available, but when the waterfront tracks are xtended, the plant will be on the main line. No difficulties were experienced n hauling by truck nor, in the case of heavy pieces, by specially built trailrs. The heaviest piece handled—the generator stator—weighed 80 tons. t was a simple matter to extend the company's distribution lines to the locaion, thus placing the plant next to the heavy city load. Fresh water is upplied by the Spring Valley Water Company directly from its distribuion mains.

The plant at present has one main unit of a rated capacity of 35,000 kw. All designs and provisions, however, were made for an ultimate of four units o that, eventually, it will be one of the largest steam plants on the Pacific Coast.

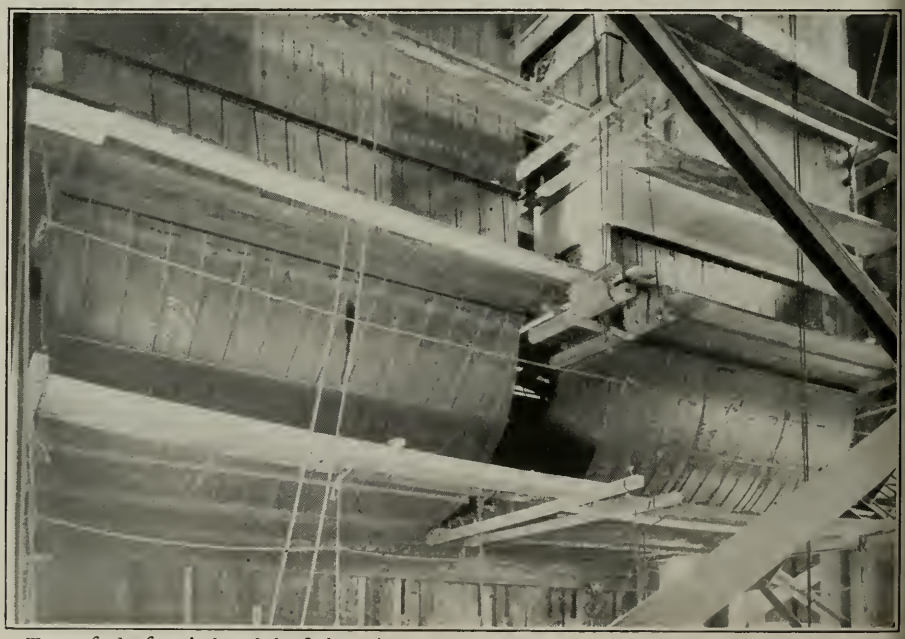
This plant was built primarily for standby service, and in that respect it as certain features, especially of an automatic nature, which are not usually ound in a base-load plant. The unit will be kept rolling at full speed at all imes and in case of any system trouble it will go from practically no load o full load in 1½ seconds. A very complicated system of automatic control as been installed to accomplish this, but this is not the place to give a deailed description of it. In order for the plant to function under such a adical change in load, reservoirs of heat have been provided where possible. t is for this reason that the boiler drums are the largest ever built, so far s we are able to determine. There are many special details in design which

were necessary on account of the excessive stresses and duty incident to such a rapid change in load. On the other hand, on account of the low load factor under which the plant will work, some of the refinements for high efficiency, such as water walls in the furnace and air preheaters, have not been installed at this time, but provisions have been made for future installation.

The structural steel frame is unusually heavy, not only on account of the great weight of the equipment to be supported, but also to provide for earthquake stresses. In height the building, which is of reinforced concrete, is about the equivalent of ten stories and in plan 196 ft. by 135 ft.

The site having been well chosen, the provision for the three principal requirements, namely, condensing water, fresh water and fuel, was easy. A channel was dredged between the two dikes, in order to bring the salt water to the intake structure. The water passes through fine mesh screens into tunnels built of concrete; these tunnels run under the building to the sections of the circulating pumps supplying the condenser. Fresh water is received through an 8-inch main feeding a 50,000 gallon tank tower from which the plant receives its supply. From the end of one of the dikes an oil pipe line was laid on pile bents to a barge moorage, and the oil is pumped from barges to a 37,500 barrel steel storage tank which is high enough to permit the oil to flow by gravity into the plant.

A full description of the equipment in the plant is a subject in itself, but some facts about the principal units are interesting. The main unit, consisting of a direct-connected impulse steam turbine and a 35,000 kw. 11,000 volt, 60 cycle generator, is mounted on a platform of structural steel and reinforced concrete which is entirely separated from everything else in the building, and from the building proper. This is done to



Two of the four induced draft ducts in Great Western Power Company's new steam plant. They are made of 3/16-inch riveted steel plate.

egregate any vibration caused by he unit or other equipment.

The condenser under the platform s of the single pass type and con- ains approximately 24 miles of 7/8 Admiralty mixture bronze tubing. The shell of the condenser is mounted n carefully adjusted springs in rder to provide for expansion. The ondensing water is supplied by two 5,000 G.P.M. pumps and after pass- ng through the tubes of the conden- er returns through two 42-inch pipes unning under the boiler room and ischarging into San Francisco bay.

There is also a house turbo-gener- tor of 2000 kw. capacity, sufficient o operate the motors on all of the uxiliary equipment. This machine is perated non-condensing. Both gen- rators are equipped with air coolers.

There are two boilers of 290,000 lbs. f water-per-hour-capacity each. The nain drums in these boilers are of in- erest due to their size, being 40 feet ong, 6 feet in diameter and made of 2 1/8-inch plate. They weigh 75 tons each and are suspended from U bolts made of 5-inch rod. There are 56 tube sections, nine 4-inch tubes to the section. Steam passes from the main drum through tubes to the auxiliary drum and then returns to the superheater. The steam pressure is 450 lbs. at the boiler and 725° super-heat.

The furnaces are the air-cooled type and are oversize in order to meet the heavy demands due to sudden change in load. Each furnace is equipped with 9 pilot burners and 20 main burners. The pilot burners will keep the unit rolling ready for emergency.

The force draft fans have a capacity of 120,000 cu. ft. of air per minute and take hot air from the hollow walls of the furnace and discharge it through the large ducts forming the furnace bottom to the wind box where the air enters the furnace. The induced draft fans have a capacity of 250,000 cu. ft. of air per minute and discharge all flue gases to the stacks.

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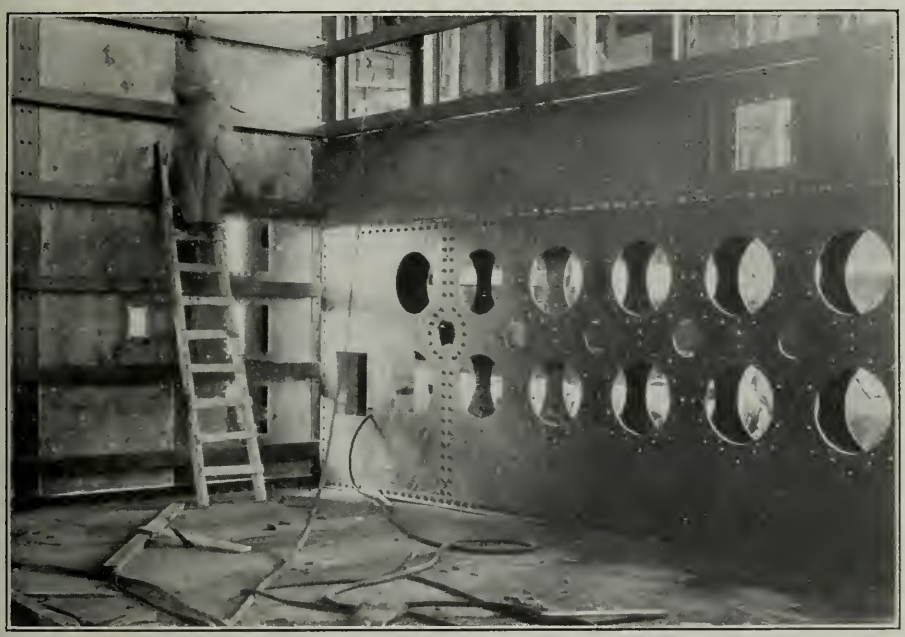

Interior view of furnace showing special plate work made by Western Pipe and Steel Company.

GREAT WESTERN POWER COMPANY'S NEW SAN FRANCISCO STEAM
erected by Western Pipe and Steel Company of California. The two welded steel smok
feet high. The riveted steel oil storage tank in the lower left foreground has 37,500-barr
right is 19 feet in diameter, 18 feet high, and has 50,000 gallons capacity. The s

ral view of the new plant shows some of the materials and equipment fabricated and lose-up view appears on the front cover of this issue, are 12 feet in diameter and 50 n diameter and 29 feet high. The hemispherical bottom tank on the steel tower at the also fabricated and erected by Western Pipe and Steel Company, is 100 feet high.

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EDITED BY RICHARD PROSSER

WE PRESENT in this issue an article specially written for WESTERN PIPE AND STEEL NEWS by Harold K. Fox, Construction Engineer of the Great Western Power Company of California. Mr. Fox's article describes in detail the new San Francisco steam plant just completed and put into operation.

We are glad of the opportunity to give publicity to this steam plant, not only because of the widespread interest in steam plant installations, but also because the just-completed unit is the first of four that will ultimately be one of the largest steam plants on the Pacific Coast and a most important factor in Great Western Power Company's system.

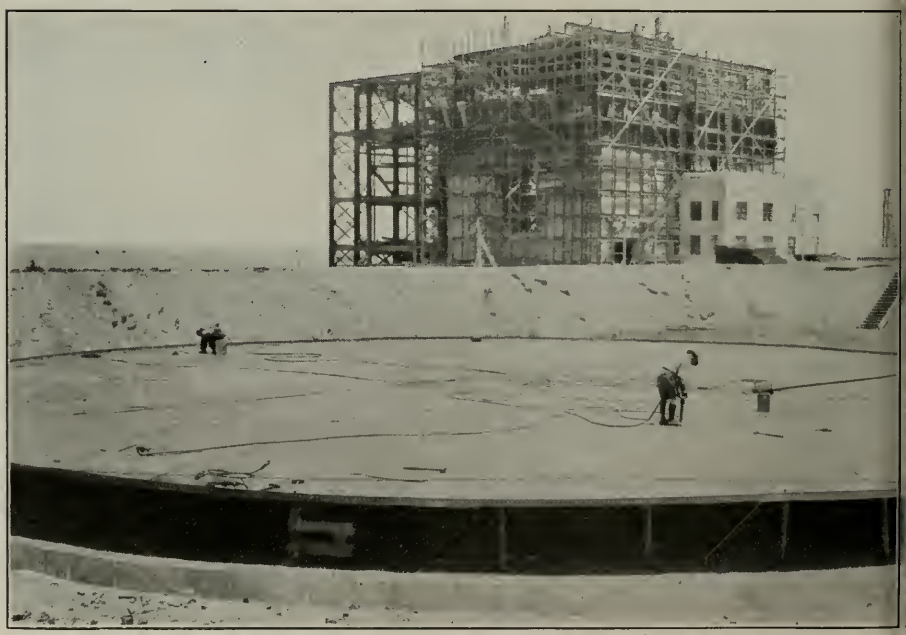
The illustrations show a few of the items fabricated and installed b Western Pipe and Steel Compan for this plant. As a matter of fact w furnished probably a wider variety o work on this particular order tha has been recorded in a long time.

Besides the smoke stacks, oil stor age tank, water tank and tower, an ducts, we furnished welded steel fur nace bottoms, a considerable quan tity of welded steel pipe, riveted stee wind boxes, galvanized vents, etc.

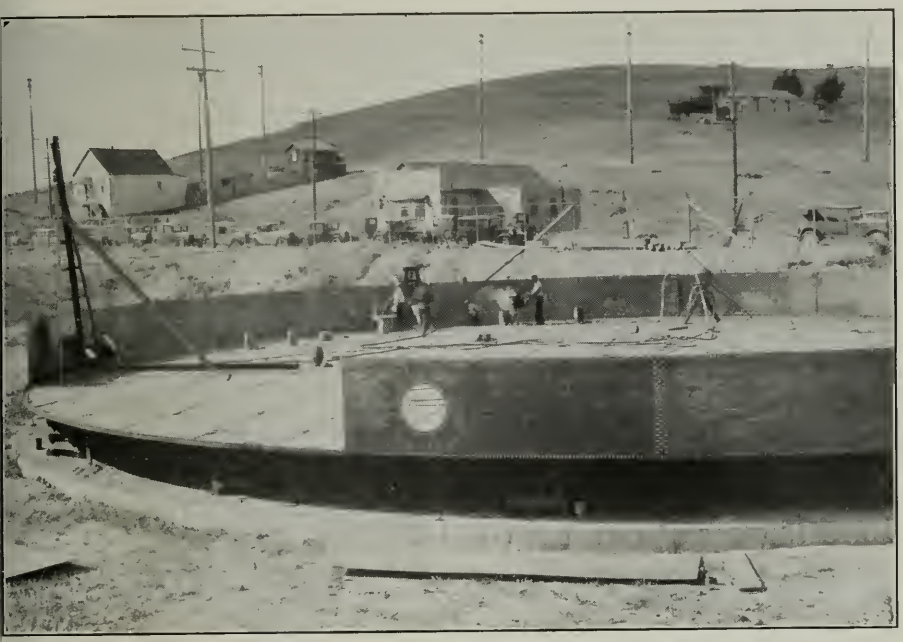
As Mr. Fox points out in his ar ticle, much of the work involve highly complicated and difficult con struction. Some of the work, in fac was so intricate that it was necessar to perform fabrication on the job in stead of in Western Pipe and Stee Company's shops.

The illustration on page tw which shows the lower part of two c the huge induced draft ducts, con veys some idea of the difficult natur of this kind of construction.

There are two of these ducts t each furnace, and each duct is 4 fee by 15 feet by 35 feet high.



Bottom of 37,500-barrel riveted steel oil storage tank before it was lowered on to foundation.



Another view showing erection of oil storage tank with the first course nearly completed.

Oil storage tank before roof was put on. View shows structural roof supports and beams.

Concluded from Page Three

In addition to these principal items of equipment there are many auxiliaries such as a motor-driven exciter, a turbine-driven exciter, two boiler feed pumps, two condensate pumps, three fuel oil pumps, vacuum pump, air compressor, make-up pumps, salt-water pumps, etc. Small steam turbines are used on some of the above but, under normal operation, motor-driven units will be used.

There are many heavy pieces in the heat balance equipment such as seventh stage leader heaters, air jets, deaërator, evaporator, tanks, preheaters, etc.

There is a great amount of sheet metal work involved, which was contracted in place to the Western Pipe and Steel Company of California. The oil storage tank and the water tower have already been mentioned and their capacity given.

The duct work, however, is anything but standardized and involved some very complicated and difficult construction. Transitions from rectangular to circular sections, warped surfaces and bends were common. We furnished plans from which the Western Pipe and Steel Company made their shop details and did the field work. Some of the plate was completely fabricated in the shop, but much of it was fabricated in the field where it could be fitted directly into place. The great amount of structural steel, piping, etc., often made this very difficult and almost impossible to provide for entirely in the plans. Our specifications called for either welded or riveted construction and the Western Pipe and Steel Company chose to weld practically all of it. Two arc machines were kept busy constantly for several weeks and sometimes were worked three shifts. The induced draft ducts especially are subjected to very high temperatures and complicated expansion joints are provided. The maximum pressure is eleven inches, water column. The most difficult work of this character was in the generator air ducts which are really one duct within another and are of large dimensions.

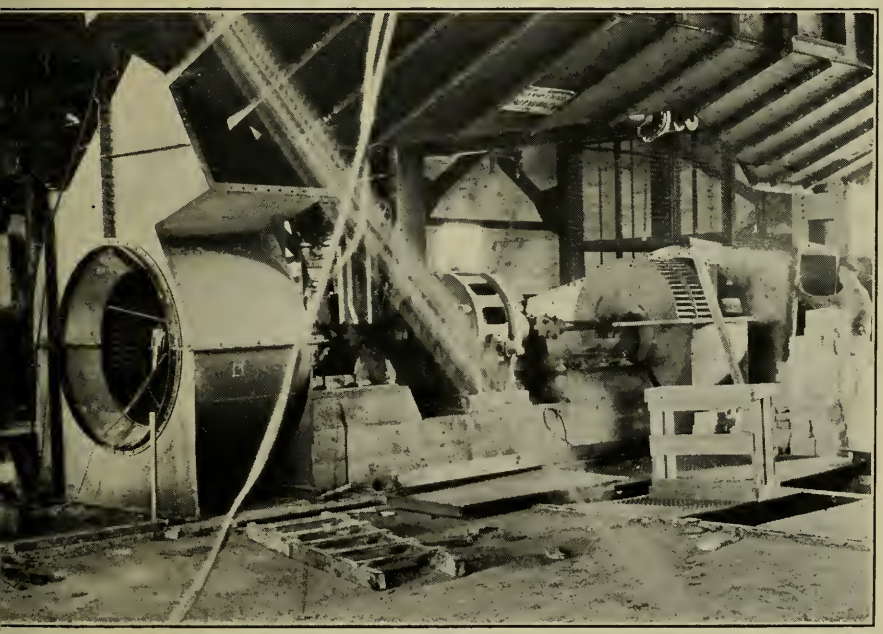
Nearly all of the ducts were made of 3/16-inch plate with 2½-inch by 2½-inch by ¼-inch angle stiffeners. The dimensions indicate a good idea of the size of the job. The induced draft ducts are four in number, two to the furnace, and are 4 feet by 15 feet in section and 38 feet high. The forced draft ducts are 4 feet by 5 feet 2 inches in section and 35 feet high. The furnace bottoms are of ¼-inch plate and have two purposes, one to support the brick insulation in the bottom of the furnace and the other to convey the hot air from the forced draft fan to the wind boxes. They are 28 feet 6 inches by 4 feet 6 inches in plan and 2 feet 8½ inches deep.

There is a stack to each boiler, and each stack is 12 feet in diameter and 50 feet high, and lined with 3½-inch gunite in which crushed fire brick is used as an aggregate.

Western Pipe and Steel Company also furnished the riveted and welded pipe for the atmospheric relief lines. The fact that the shops at South San Francisco are near the site was an advantage on this work as the material was hauled by truck directly to the job and the erection gang could be changed in number as progress of the work would permit.

The plant was built by the Construction Department of the Great Western Power Company of California and designed jointly by the Engineering Department and McClellan & Junkersfeld, Consulting Engineers, of New York. C. P. Rhine was resident engineer, W. H. Gilstrap, foreman, and Russell Branch representative of the engineers.

Interior view of 37,500-barrel riveted oil storage tank showing swing pipes and roof supports. The tank is 96 feet diameter and 29 feet high.



Forced draft ducts for Great Western Power Company's new steam plant were fabricated and installed by Western Pipe and Steel Company.

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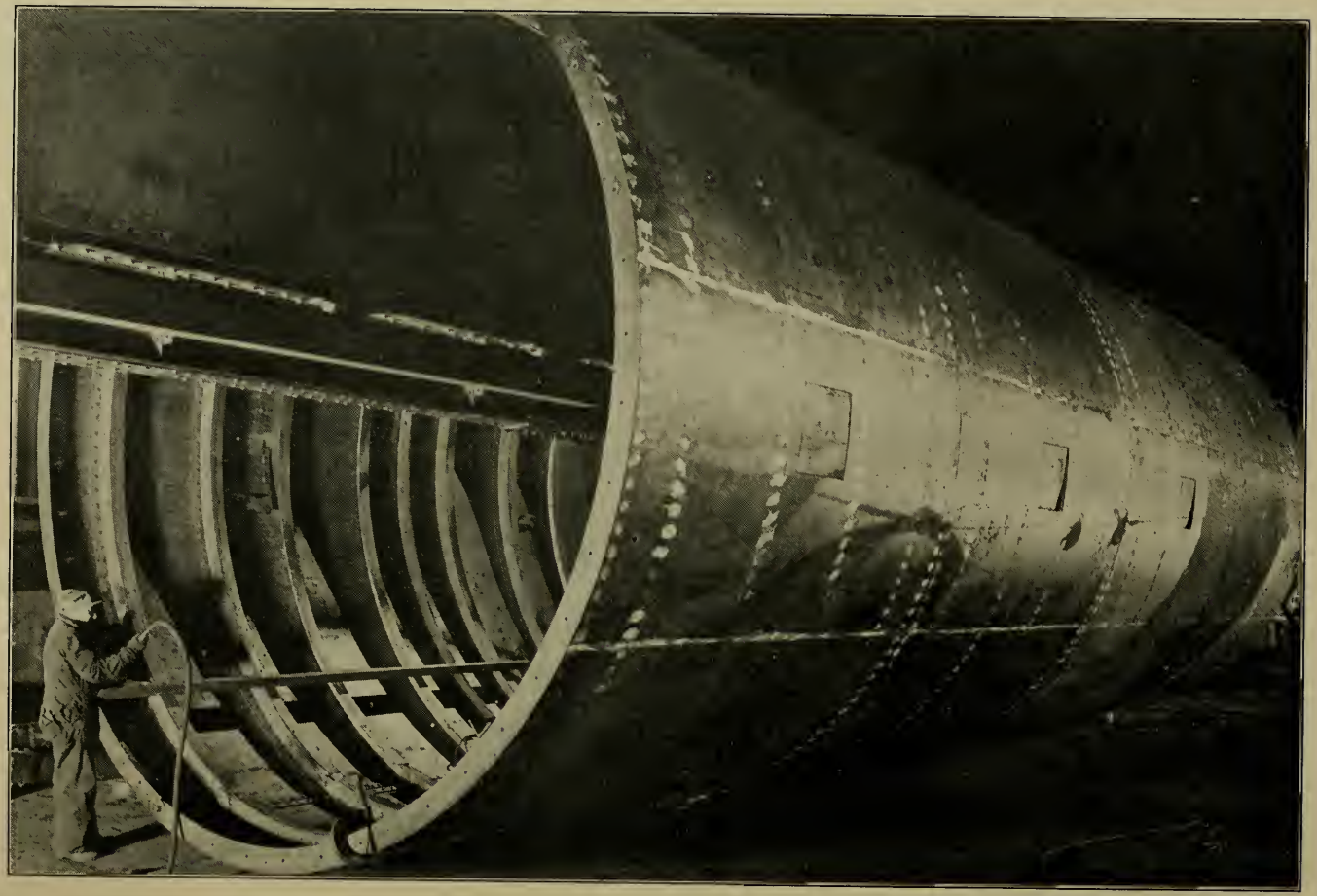

SHOP ASSEMBLY OF HACKLEY STEEL TUNNEL FORM.—*This view shows one of three Hackley steel tunnel forms fabricated by Western Pipe and Steel Co.*

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VOLUME VII JANUARY, 1930 NUMBER 1

Youdall Construction Co. Adopts Hackley Steel Tunnel Forms For Use on Cushman No. 2 Tunnel, City of Tacoma

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA has recently completed the first of three steel tunnel forms of entirely new and original design, for the Youdall Construction Co. for use on Cushman No. 2 tunnel, City of Tacoma. The first of these unique tunnel forms, the shop assembly of which is illustrated in this number, is now in operation and the other two will follow shortly.

This form, which is so designed as to make it possible to accomplish the concrete lining of an entire section of tunnel at one operation, was designed and patented by Roy C. Hackley, M. Am. Soc. C. E., Consulting Engineer, associated with the Youdall Construction Co. on the Tacoma project.

Mechanically the apparatus is the embodiment of simplicity. The following description, together with the illustrations, will give engineers and others interested a good conception of the working of the Hackley tunnel form.

The apparatus consists of a circular steel shell slightly flattened at the top, 17 feet in diameter and 40 feet long, made of ¼-inch plate. This cylindrical steel shell travels on rollers on top of the steel girder from which the form is suspended. This girder is 83 feet long and itself travels on rollers resting on a wide-gauge track.

At the beginning of tunnel lining operations, the form is put in place as shown in the illustrations. Incidentally, it should be mentioned here that the concrete lining of Cushman No. 2 tunnel is 15 inches thick, the tunnel being circular in section.

A concrete gun is placed in the driven tunnel ahead of the form. The concrete gun used on this project was also designed and patented by Mr. Hackley. The pipe leads back and up over the top of the form and at the nozzle there is a specially designed distributor which distributes the concrete laterally so that it is formed in horizontal layers.

The concrete goes down around the sides of the steel form by gravity. The method is very rapid in operation. Along each side of the form there are several inspection doors through which the condition of the concrete can be observed. After proper time allowance for the concrete to set, usually a matter of twenty-four hours, the form is collapsed and moved forward 40 feet.

When the concrete lining of a section is properly set and the time comes

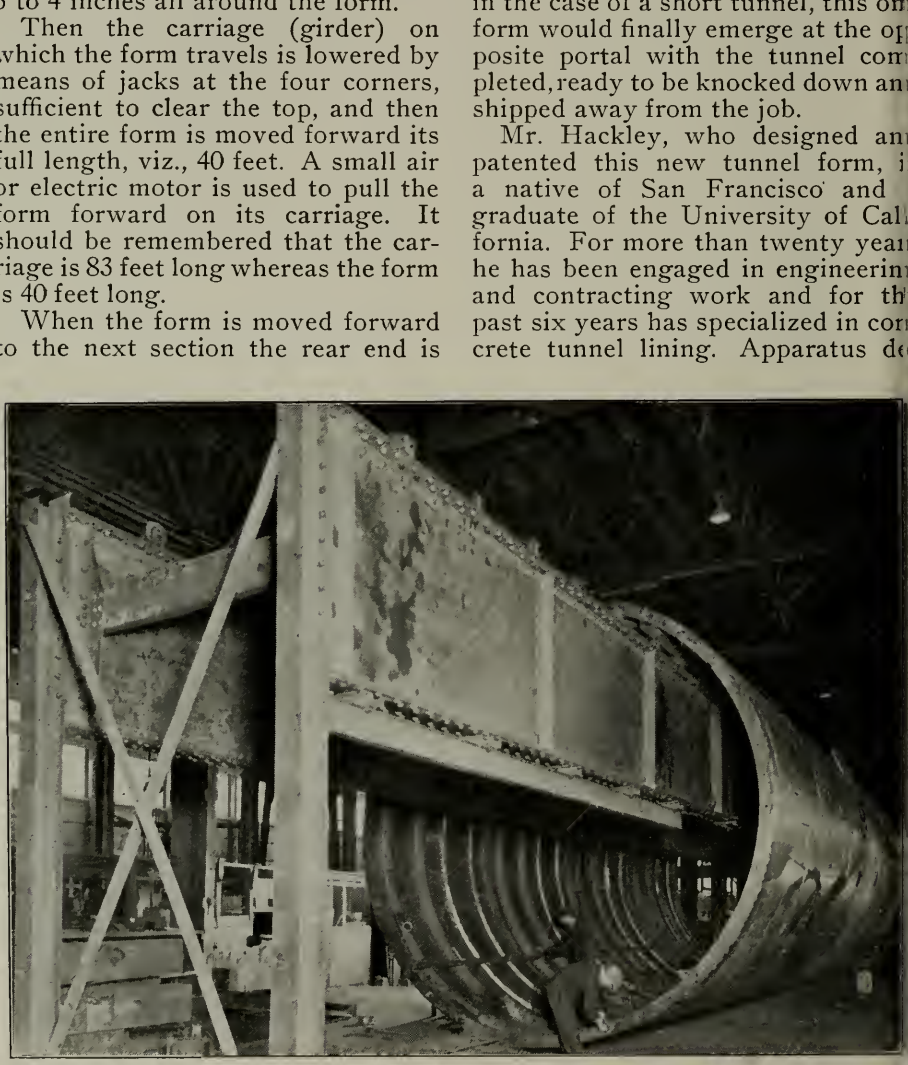
to move the form forward for the next section, the bottom segment of the form, which is hinged along one edge, is swung upward on its hinges and held up by a trolley that travels along an I beam under the girder. When this bottom segment is lifted the two side segments of the shell, which are hinged at the top, swing inward far enough to give a clearance away from the concrete of from 3 to 4 inches all around the form.

Then the carriage (girder) on which the form travels is lowered by means of jacks at the four corners, sufficient to clear the top, and then the entire form is moved forward its full length, viz., 40 feet. A small air or electric motor is used to pull the form forward on its carriage. It should be remembered that the carriage is 83 feet long whereas the form is 40 feet long.

When the form is moved forward to the next section the rear end is stopped so as to make proper contac with the section just lined. The fror end is bulkheaded with boards tha close it completely. The form is ex panded to its full section, the bottor segment put in place and it is read for the next section to be poured.

This operation is repeated with th form moving forward 40 feet at time until the tunnel is completec If only one form were being used, a in the case of a short tunnel, this on form would finally emerge at the op posite portal with the tunnel com pleted, ready to be knocked down an shipped away from the job.

Mr. Hackley, who designed an patented this new tunnel form, i a native of San Francisco and graduate of the University of Cal fornia. For more than twenty yea he has been engaged in engineerin and contracting work and for th past six years has specialized in cor crete tunnel lining. Apparatus de



The entire apparatus is shown in this picture. Its operation is described in detail in the accompanying article.

signed by him has been used on many tunnels constructed in the West.

Mr. Hackley was in charge of the construction of Twin Peaks tunnel in San Francisco from 1914 to 1917; was also on the Skagit tunnel of the City of Seattle power development project; and on the Sunset-Duboce tunnel in San Francisco.

The Youdall Construction Co., of which Leonard F. Youdall is president and general manager, has been awarded many notable contracts on the Pacific Coast since the formation of the company some eight years ago. Among the major projects upon which Mr. Youdall and his associates have been engaged in recent years are the Sunset-Duboce tunnel in San Francisco, the ditching and trestle work on the Bay Crossing Division of San Francisco's Hetch-Hetchy water supply (as sub-contractors for Western Pipe and Steel Company of California); the Banta-Carbona Irrigation District, and several reclamation and irrigation projects in the Sacramento valley.

Cushman No. 2 tunnel, which is now being driven by the Youdall Construction Co., is a part of the extensive hydro-electric development program of the City of Tacoma. Its location is on the Olympic Peninsula about seventy miles northwest of Tacoma. It is 13,000 feet in length and pierces the Olympic Mountains to divert water from the Skokomish river.

The water is dropped down from the tunnel through twin steel penstocks to a power house on the Hood canal, which will develop 75,000 kilowatts. The project will be completed in about twelve months. The tunnel is 17 feet in diameter inside the completed lining, the concrete lining being 15 inches thick. The project is being carried out under the supervi-

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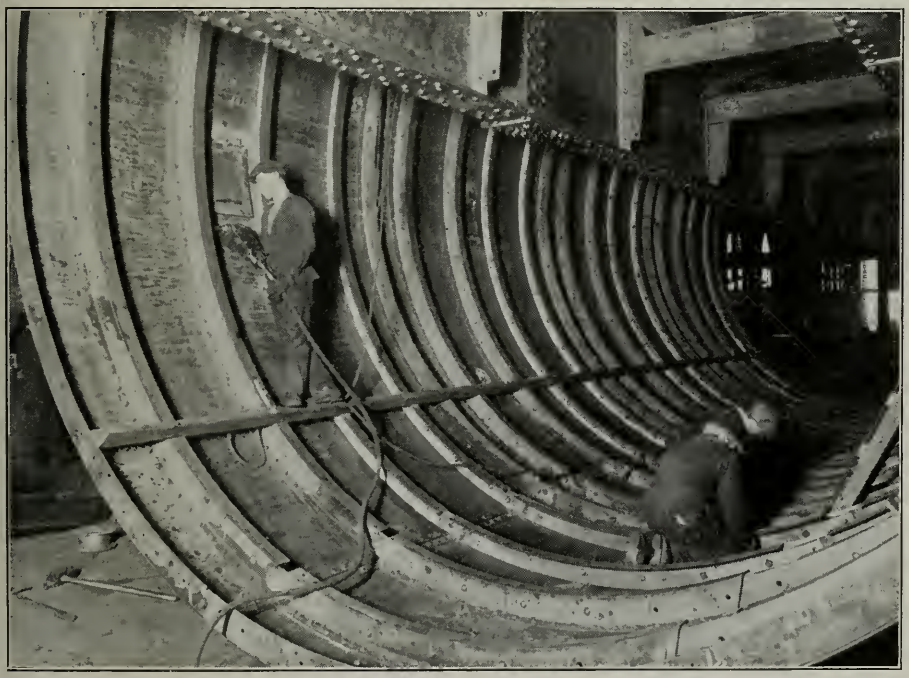


Close-up interior view of the Hackley steel tunnel form. One of the inspection doors is directly in front of the face of the workman at the left.

HACKLEY STEEL TUNNEL FORM, FABRICATED BY WESTERN PIPE AND STEEL PANY FOR YOUDALL CONSTRUCTION CO.—*This is one of three forms to be used on Ci No. 2 tunnel, City of Tacoma hydro-electric development program. The form is 17 feet in di and 40 feet long, and travels on a carriage 83 feet long. The carriage has uprights at each en*

ollers, and moves on a wide gauge track as the tunnel progresses. This form, which is of entirely nd original design, makes it possible to completely line an entire 40-foot section of tunnel in- g the invert, at one operation. The accompanying article describes its operation fully. Similar are being used on the Hetch Hetchy Coast Range tunnels for the City of San Francisco.

Western Pipe and Steel News

PUBLISHED BY

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles
Edited by Richard Prosser

Engineers, public officials, and others concerned with projects involving tunnel work will find in this issue of Western Pipe and Steel News a descriptive article and a series of pictures depicting the new type of steel tunnel form designed by Roy C. Hackley and put into use for the first time by the Youdall Construction Co. in connection with Cushman No. 2 tunnel of the City of Tacoma's hydro-electric development program.

These steel tunnel forms were fabricated at our South San Francisco plant, and we take pleasure in being the first to publish the facts regarding this new apparatus. First, because of the general interest in such a subject; and, secondly, because of the fact that this is a splendid example of that type of steel specialty fabrication for which this company is noted.

On the opposite page are shown two widely differing products of our Los Angeles plant. One picture shows a 40-ton rotary steel kiln shell for a cement mill. The other picture illustrates a product in which this company takes great pride because of the fact that it is universally recognized in the oil industry as being in a class by itself. We refer to oil well casing, which we manufacture from hard red steel.

Concluded from Page Three

sion of J. L. Stannard, chief engineer, Department of Utilities of the City of Tacoma.

In addition to the steel tunnel forms for the Youdall Construction Co., Western Pipe and Steel Company of California is fabricating the penstocks and all accompanying accessories, surge tank, etc.

The twin penstocks, which lead from the outlet of the tunnel down to the power house, consist of riveted steel pipes which are 126 inches in diameter at the top and 96 inches in diameter at the power house. Each penstock is approximately 1316 feet long. They are made of steel plates ranging in thickness from 1 1/8-inch to 7/16-inch.

These penstocks come out of the tunnel through a three-way Y branch 17 feet in diameter in the tunnel and branching into three outlets each 10 feet 6 inches in diameter.

The third outlet of the Y branch was planned so that an additional penstock can be installed at some future time. The penstocks are designed for a static head of 475 feet.

The Y branch, which is believed to be one of the largest ever designed, is now being fabricated, together with the penstocks, at the South San Francisco plant of Western Pipe and Steel Company. The company is also supplying two 10 feet 6 inches butterfly valves together with expansion joints, air valves, anchors, etc.

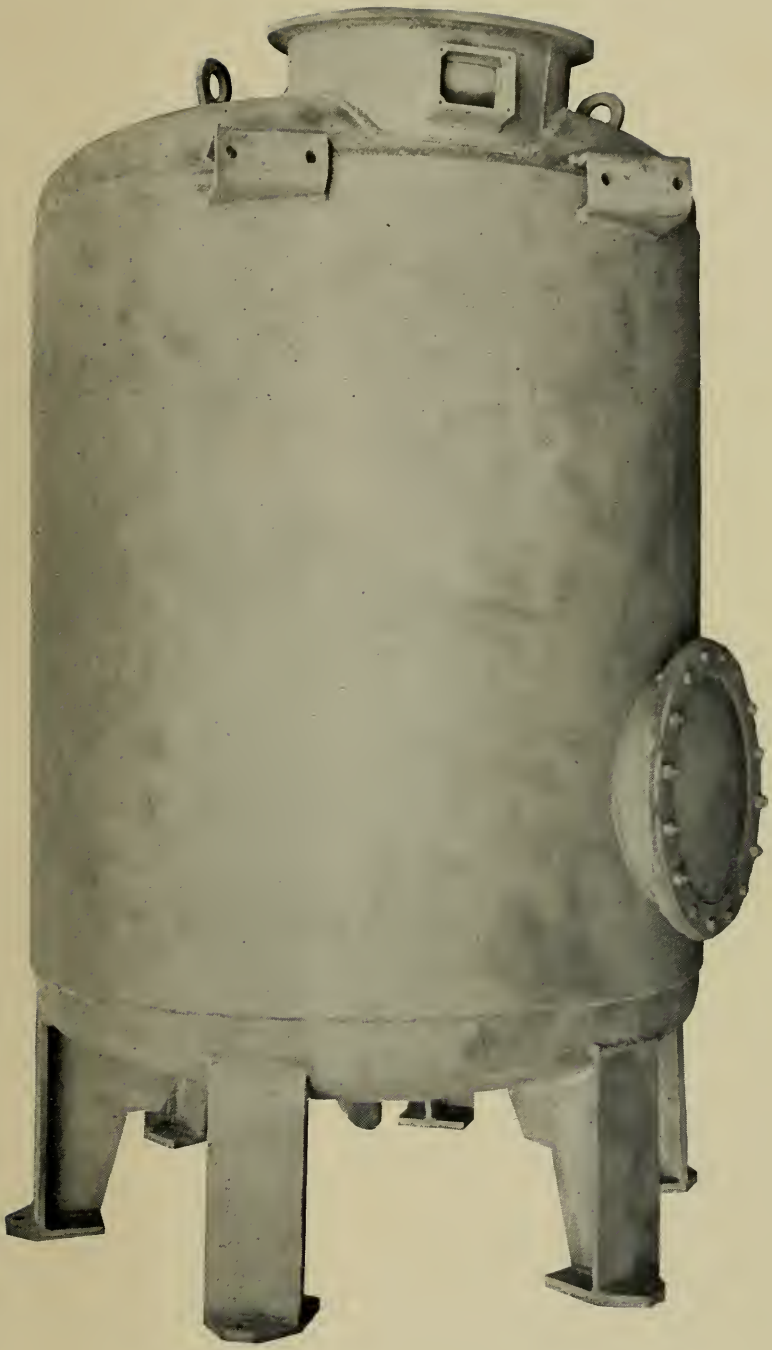
The differential surge tank which this company is also fabricating, is 65 feet in diameter and 94 feet high, and is made of riveted steel plates ranging from 5/16-inch to 15/16-inch in thickness. The internal riser pipe is 14 feet 6 inches in diameter and 88 feet 3 inches in height and is made up of steel plates ½-inch thick.

Cement kiln fabricated at our Los Angeles plant for Southwest Portland Cement Co. Length 52 feet 4 inches, main body 10 feet in diameter, made of ¾-inch plate with single butt strap.

"Stovepipe" oil well casing as fabricated by Western Pipe and Steel Company is in demand in every oil field in the West. Above view shows "Stovepipe" casing at Los Angeles.

This view at the Phoenix plant of Western Pipe and Steel Company shows the diversified products manufactured there. The large pipe is a section of penstock fabricated for the Salt River Valley Water Users Association.

Interior view, heavy plate shop, Phoenix. The large bend in the background is a section of penstock 13 feet 6 inches in diameter. Principal products of the Phoenix plant are water well casing, galvanized corrugated culverts, water pipe, tanks, irrigation gates, etc.



OIL CIRCUIT BREAKER TANK FABRICATED FOR PACIFIC ELECTRIC MANUFACTURING CO.—*This picture was made at the South San Francisco plant of Western Pipe and Steel Company. Specialty work of this kind calls for the utmost precision. The tank shown is 64 inches in diameter and 68 inches high between welded seams.*

Unquestioned Responsibility in Shop and Field

WESTERN PIPE & STEEL CO. OF CALIFORNIA

Designers, Fabricators and Erectors of

STEEL PRODUCTS

Western Pipe & Steel Co.

of CALIFORNIA

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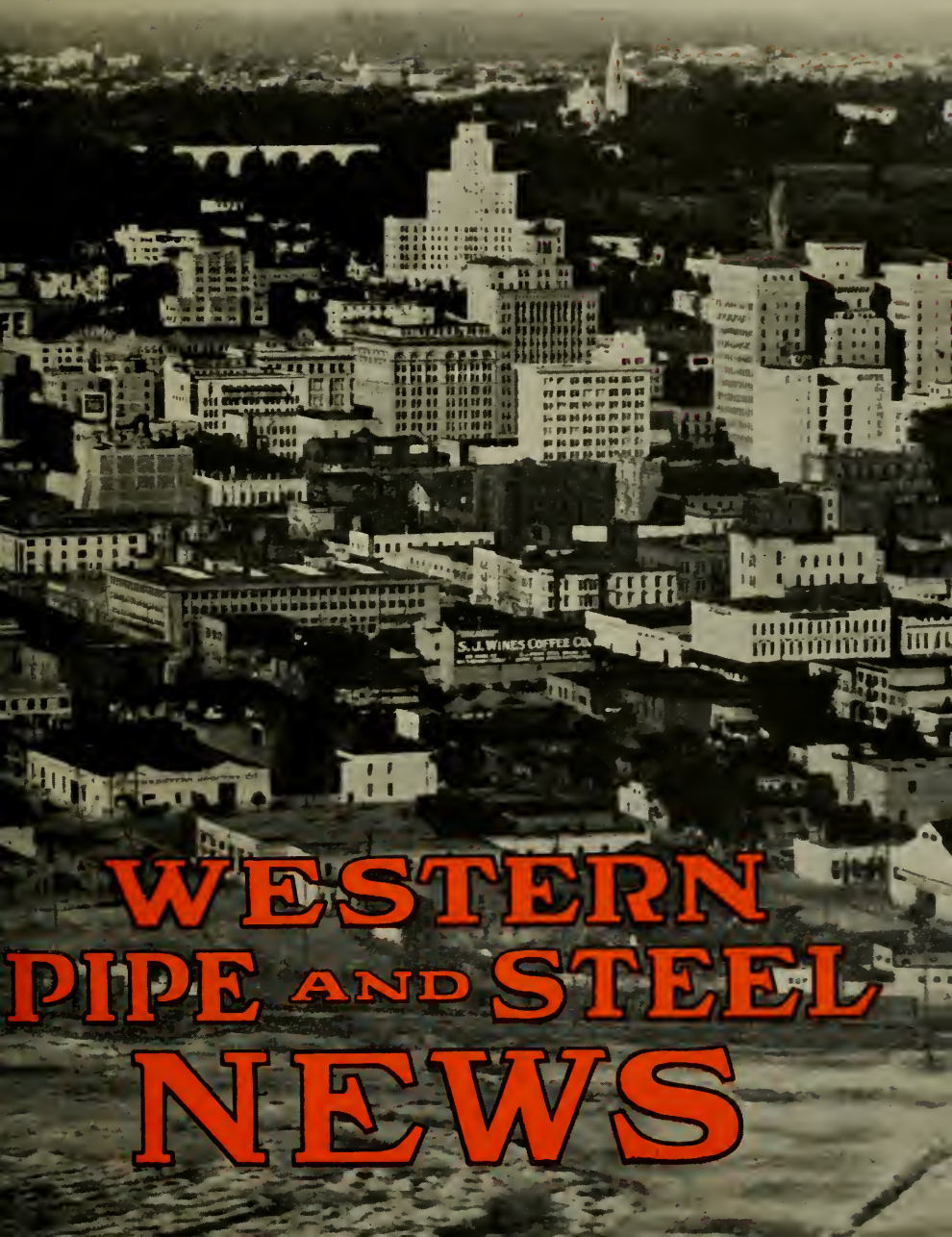
FACTORIES

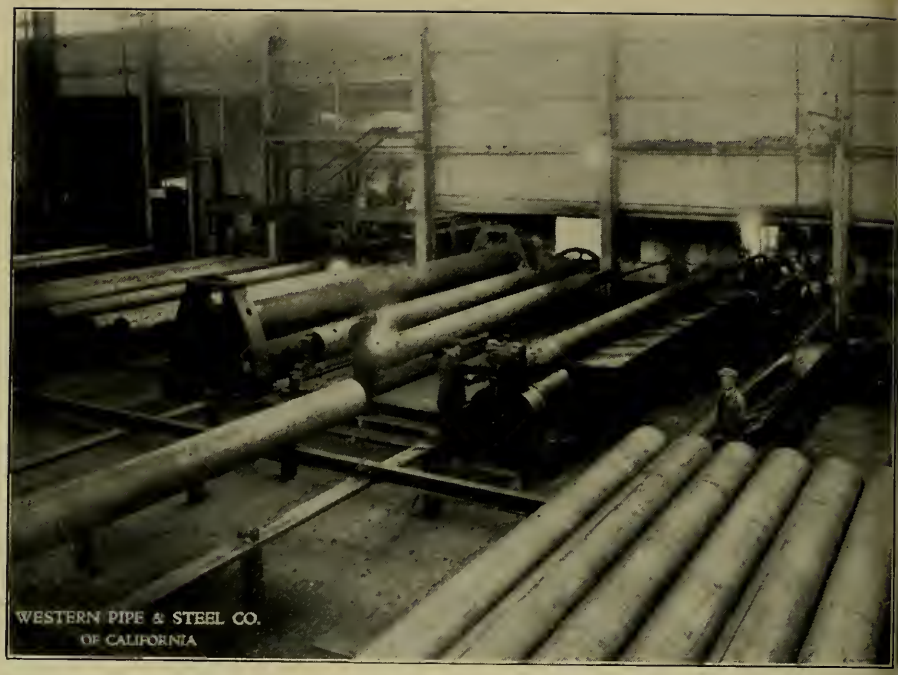
SOUTH SAN FRANCISCO LOS ANGELES FRESNO TAFT PHOENIX

SPECIAL COLLECTIONS

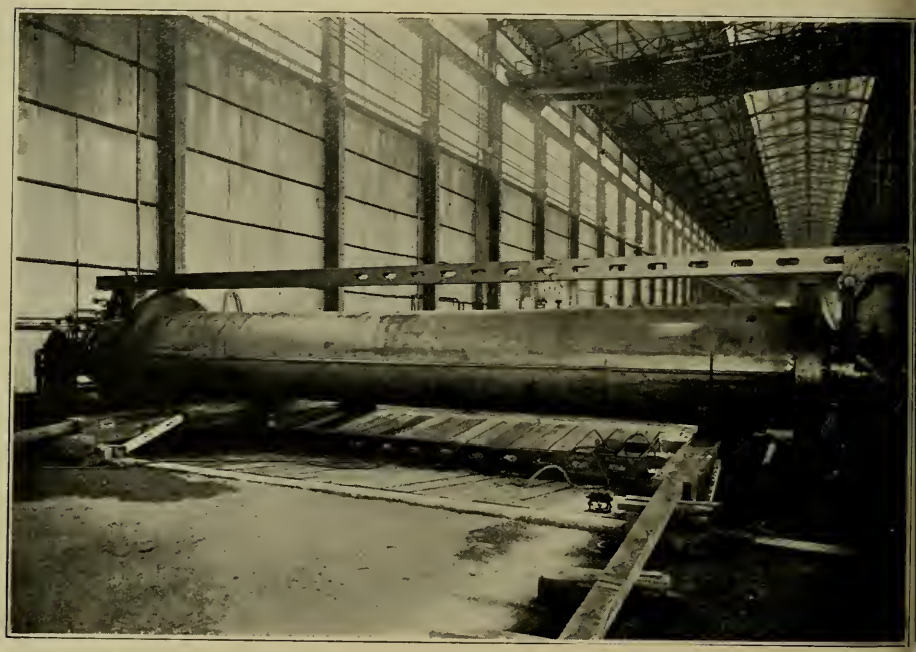
Again! San Diego Chooses Steel Water Pipe



WESTERN PIPE AND STEEL NEWS



The electrically welded steel pipe for San Diego's new water transmission line will be fabricated at Western Pipe and Steel Company's South San Francisco plant. The above picture was taken at South San Francisco while similar, though smaller, pipe was being fabricated.



Before being shipped, every section of steel pipe for the City of San Diego will be subjected to hydraulic test. The testing machine is illustrated above, with a section of 36-inch Lock-bar steel pipe under pressure.

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VII FEBRUARY, 1930 NUMBER 2

San Diego Places Third Large Consecutive Order With W. P. & S. Co. for Steel Pipe Line

THE LATEST FEATURE of the water development and transmission program of the City of San Diego, the about-to-be-constructed Otay Reservoir-San Diego second main pipe line, presents an interesting nd unusual feature, viz., it is the third main carrying pipe line installed by he city since 1914, and for the third consecutive time, Western Pipe and teel Company of California has been called upon to bring its resources and experience to the task of fabricating and installing the steel pipe. Incidentally it will be the Western Pipe and Steel Company's fourth consecutive important steel pipe job in the vicinity of San Diego, its record being the replacement of the Sweetwater Company 36-30-inch main pipe line from the Sweetwater reservoir, six miles long through the Sweetwater valley, four miles of which had been carried away by the flood of 1916. This pipe was originally installed in 1887, and is now in full operation.

HIRAM NEWTON SAVAGE

San Diego's phenomenal population growth and territorial expansion in the last two decades are reflected in the Herculean efforts the city has been obliged to put forth in the development, transmission and distribution of water. The construction of these three main pipe lines for the City of San iego, all of which are steel pipe, is one of the most important features of the roblem of increasing the city's water supply, as the population increases.

The first of these three main pipe lines, known as the Bonita line, was stalled in 1914.

Hiram Newton Savage is engineer in charge of the municipal bureau of ater development of the City of San Diego. It is interesting to note that r. Savage's background as an authority on San Diego's water prob-m dates back to January, 1891, when he was employed as civil and

hydraulic engineer by the San Diego Land and Town Company. Following the flood of 1893, which washed away the pipe line below Sweetwater dam, he had charge of the work of replacing it.

In 1903 Mr. Savage joined the United States Reclamation Service. He was recalled to San Diego by J. P. Morgan Company of New York, owners of the Sweetwater Water Company, after the disastrous flood of January, 1916, and again placed in charge of the work of repairing the Sweetwater dam, replacing the pipe line and rehabilitating the water system. The pipe work was performed by Western Pipe and Steel Company.

From June, 1917, to September, 1919, he was employed by the City of San Diego and constructed, with city forces, a new monolithic masonry dam on the site of the original Lower Otay dam.

Under Mr. Savage's direction, construction was conceived, initiated and started in September, 1919, on the Barrett dam, which he completed with city forces in July, 1922. In 1922-23 Mr. Savage designed and advanced the heightening of the Morena dam, raising it 10 feet to its present height of about 168 feet above streambed.

In June, 1928, the mayor and common council of San Diego urgently requested Mr. Savage, who was then in Europe, to return and take charge of the municipal water supply system, impounding and carrying, pumping, filtration and purification features, and the development of additional water supply. He was persuaded to return to San Diego and on July 2, 1928, assumed duty as hydraulic engineer in charge of the municipal bureau of water development.

The Bonita line consists of about 12 miles of 20-inch diameter riveted steel pipe, and, as has been stated, it was furnished by Western Pipe and Steel Company.

The second steel pipe line, known as the Lakeside or El Capitan line was installed in 1926-27. It consists of about 16 miles of 36-inch diameter lock-bar steel pipe, and leads from the Lakeside pumping station to the city's University Heights reservoir, the central distributing point of the city system.

Western Pipe and Steel Company fabricated and installed this line also.

Pending the construction of an impounding reservoir on the San Diego river it is being used in emergency for the transmission to University Heights reservoir of water pumped from the water-bearing sands along the San Diego river above Mission gorge. During the year 1929, about one billion gallons of water were pumped through this line.

From the time of the earliest settlement at Old Town, when water was carried in barrels and other containers from mere water holes in the channel of the San Diego river into the settlement, down to the present time, there has been no time when San Diego has not taken a portion of its water supply from the water-bearing sands of the San Diego river.

At the present time the city owns and operates three pumping plants on the San Diego river; the Lakeside plant located at Lakeside, about 16 miles upstream from San Diego which was placed in operation October 1, 1928; the Riverview plant located one mile west of Lakeside which was placed in operation July 7, 1927, and the Mission Valley plant located within the city limits below and a little upstream from the Mission Cliff gardens, which has been in operation through the majority of the summer seasons, since it was first placed in operation in 1914.

The Lakeside plant consists of six

vells, all of which are in operating ondition, and which are operated hrough the summer months, as eeded. Water is pumped from these vells through a system of about 800 feet of 10 to 18-inch steel pipe, nd into the eastern end of the Lakeide-San Diego pipe line.

The Riverview plant consists of 1 wells, all of which are in operatng condition, and operated through he summer months as needed. Vater is pumped from these wells hrough a system of about three niles of pipe, from 10 to 24 inches in iameter, direct to the Riverview ump.

The booster pump at Riverview aises the water from the sump and oosts it into the Lakeside-San Diego 6-inch steel pipe line, through which is carried to the University Heights eservoir, inside the city limits.

The Mission Valley plant consists f 10 wells, all of which are in operting condition and are operated hrough the summer months, as eeded. Water is pumped from these vells through a system of about two niles of 10 to 18-inch steel pipe line, nto the Mission Valley sump, and rom that point it is boosted through bout four miles of 16-inch pipe to a onnection with the Lakeside-San Diego pipe line at Thirtieth and Meade streets, and through that pipe ne into the University Heights resrvoir.

The third and latest main transission line is the new Otay Reseroir-San Diego second main pipe ne, which is located between the lter plant at Lower Otay reservoir, nd the University Heights reseroir, a distance of about 19 miles. This new line is to be completed by October 1, 1930.

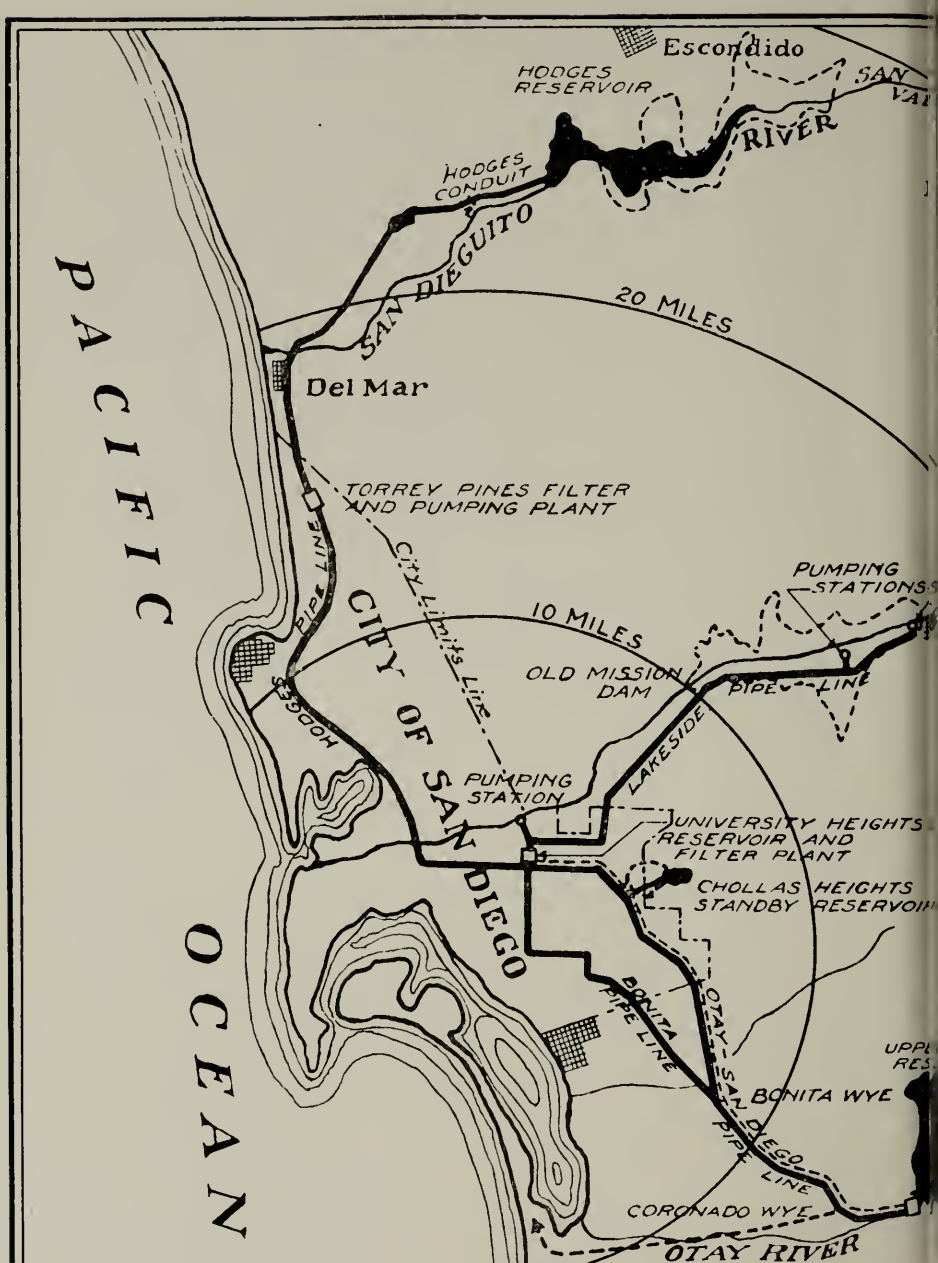
On the contract awarded to Western Pipe and Steel Company of California, there is included approximately 86,000 linear feet of electric welded steel pipe "in place." Of this total footage, about one-half is of 40-inch diameter, and one-half 36-inch diameter. Varying thicknesses of steel plate, to meet the different pressure requirements, are called for as follows: Of the 40-inch diameter pipe, about 31,000 feet will be made of 3/16-inch steel plates; about 11,000 feet made of ¼-inch plates, and 830 feet made of plates 5/16-inch thick.

Of the pipe that is 36 inches in diameter, 21,560 feet will be of 3/16-inch plate; 13,340 feet of ¼-in plate; 4,910 feet of 5/16-inch plate, and 3,100 feet of ⅜-inch plate.

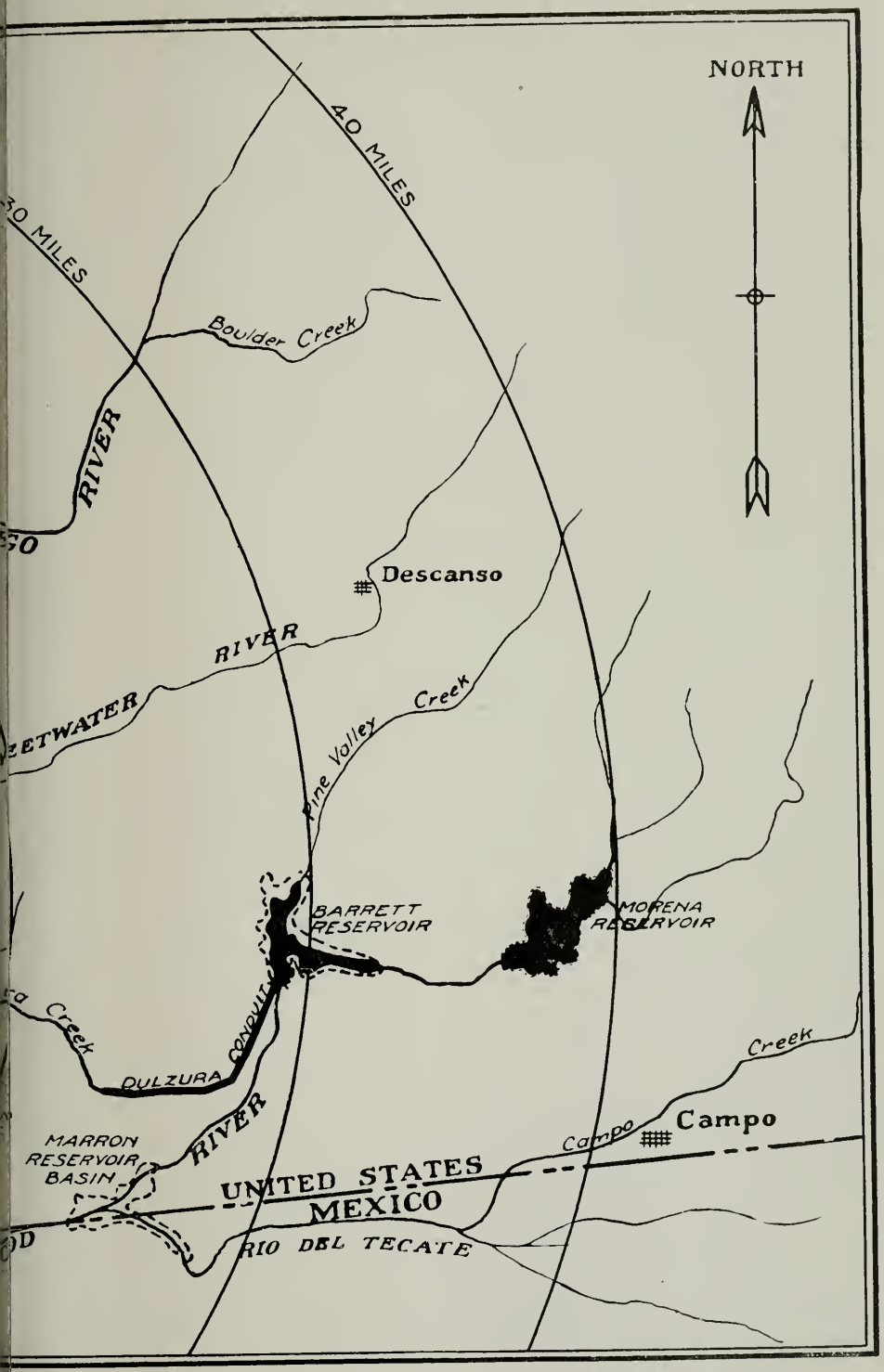
The total length of the pipe to be furnished by Western Pipe and Steel Company of California is about 16 miles. All of this steel pipe is to be dipped in hot asphaltum and wrapped with special felted fabric, with the exception that where the pipe is in a tunnel, it is dipped in asphaltic compound, but not wrapped.

The new pipe line is to replace the present wood-stave line, which was installed in 1901. It will have a much greater carrying capacity, as the new line is of larger diameter than the old wooden pipe. As planned by Mr. Savage, the new steel pipe line will bring water from three sources, including Morena and Barrett reservoirs on the Cottonwood river and Lower Otay reservoir on the Otay river, by an inter-connected system. The present capacity of this system is about 10,000,000 gallons daily. However, the program as laid out by Mr. Savage, calls for Morena and Barrett reservoir dams to be heightened sufficiently to provide a net safe daily water supply of about 17,000,000 gallons. In the future, by the use of booster pumps, the carrying

Continued on Page Six



MAP OF SAN DIEGO WATER SUPPLY SYSTEM SHOWING ROUTE OF NEW 16-
STEEL PIPE LINE.—*This map, made in the office of Hiram Newton Savage, Hyd*
Engineer in charge of the Municipal Bureau of Water Development of the City of San D



s the reservoirs, streams and pipe lines of the water supply system. The dotted line which runs Lower Otay reservoir to University Heights reservoir, indicates the new electrically welded pipe line to be fabricated and installed by Western Pipe and Steel Company of California.

Western Pipe and Steel News

PUBLISHED BY

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles

Edited by Richard Prosser

It is an axiom of business that the best recommendation an institution can have is a satisfied customer. It is, therefore, with deep satisfaction that we record in this issue of Western Pipe and Steel News the circumstances regarding the award to this company of the third consecutive large steel pipe line for the City of San Diego. Besides the fabrication and installation of these three large steel pipe lines for the transmission of water, Western Pipe and Steel Company of California also was given some years ago an order for the replacement of several miles of steel pipe that had been swept away by flood.

There are many factors that enter into complete customer-satisfaction. Primarily, of course, such a condition reflects first class materials and workmanship. And in the matter of workmanship must be considered that performed both in shop and field. There are also the factors of promptness in deliveries and the personal equation between officials and employees of the company and the customer, and the agreeable solution of the many minor details that always surround work of this character.

Western Pipe and Steel Company of California feels that the record of its relationship with the officials and engineers of the City of San Diego represents customer-satisfaction raised to the nth degree. At the same time we would like to point out that San Diego is the rule, not the exception. We have had the same pleasant relationship, the same type of repeat orders, based on satisfactory work and service, with many other customers over a long period of years. This is an intangible asset, but its value is incalculable.

Continued from Page Three

capacity of the second main pipe line may be increased to upward of 25,000,000 gallons daily, thus increasing to two and one-half times the present capacity of 10,000,000 gallons.

The notice inviting bids on the new Otay Reservoir-San Diego second main pipe line included specifications for three different kinds of pipe: electric welded steel pipe, cast iron pipe, and concrete. Proposals were received up to December 23, 1929, and after due consideration the contract for the fabrication and installation of about a 16-mile reach of the pipe line was awarded the Western Pipe and Steel Company of California for electric welded steel pipe.

As a matter of fact, the concrete pipe manufacturers did not avail themselves of the opportunity to bid on this about 16-mile reach of pipe line, in spite of the fact that a schedule of specifications for concrete pipe was prepared for them. Presumably, they did not respond because of the varying and high pressure heads encountered in the line, to say nothing of the difficulties presented by the rugged character of the terrain.

As to cast iron pipe for the 16-mile reach, only one bid was received and that was for pipe of French manufacture. This might indicate that the

ɔughness of the country, making it irtually impossible, both physically nd economically, to deliver cast iron ipe in the field on account of its eavy weight and awkwardness in andling, was an inescapable factor ı forcing cast pipe out of considera-on. Furthermore, the prohibitive ɔst of installing cast iron pipe in ıch rough country would be fur-ıer increased by the large number f both horizontal and vertical angles ı the pipe line.

In view of these factors, which involve not only the vast difference in the initial cost of the pipe itself, but also in the cost of installing it, the selection of steel pipe for this project was logical and inevitable. As a matter of fact, the conditions surrounding the installation of this line are absolutely ideal for steel pipe, with its tremendous advantages of light weight, ease of handling in the field, and the absence of any serious difficulties in making the necessary angles.

The main reason, of course, in the preference given the Western Pipe and Steel Company's bid on steel pipe, was the tremendous saving in the initial cost. Just how significant this great difference in the initial cost, as between steel pipe and cast iron pipe really is, may be gathered from the following statement which may be verified by anyone who wishes to make the computation:

If the difference in initial cost be computed at compound interest, it would amount to a sum sufficient to install another steel pipe line in about 12 years. This, carried on for the life of the pipe, would mean a saving of several million dollars. These figures are based on the assumption that the life of the steel pipe line will be from 40 to 50 years, a modest enough estimate in view of the present day efficiency of the process, as developed by Western Pipe and Steel Company of California, of dipping and wrapping steel pipe for the protection of the metal.

In addition to all the foregoing facts, it is probable that the selection of steel pipe for San Diego was influenced in the minds of those charged with making the decision, not only by San Diego's own favorable previous experience with steel pipe and with Western Pipe and Steel Company of California, but also because steel pipe for large water lines is used almost exclusively by the principal Pacific Coast municipalities.

That steel pipe has proved satisfactory is evidenced by its repeated use. Such cities as Los Angeles, Seattle, Portland and San Francisco, are examples of large municipalities that have consistently and practically exclusively used steel pipe for their main water supply carrying lines for many years. San Diego itself is a notable example, for, as was pointed out at the beginning of this article, the present pipe line is the third steel conduit to be installed by the city since 1914.

From among the scores of other cities on the Pacific Coast that have installed steel water pipe made by Western Pipe and Steel Company, and also among water companies, irrigation districts, etc., may be named the following, as evidence of the high regard in which steel pipe is held for carrying water:

Sacramento, Oakland, and the East-bay Municipal Utility District, Vallejo, Marin Municipal Utility District, San Jose Water Company, Santa Cruz, Monterey County Water Works, Fresno Consumers Water Company, Riverside, San Bernar-

dino, Redlands, Ontario, Monrovia, Arcadia, Monterey Park, Sierra Madre, Ventura, Oceanside, Oak Park Water Company, Fontana Land Company, Glendora Consol. Mutual Irrigation Company, Glendora Independent Water Company, Sunnyslope Water Company, South Los Angeles Land & Water Company, Yorba Linda Water Company, La Habre Heights Water Company, Lincoln Heights Water Company, Montecito County Water Company, Zone Mutual Water Company, Los Angeles County Sanitation District, Sutter Basin Company, Lindsay-Strathmore Irrigation District, Turlock-Modesto Irrigation District, Banta-Carbona Irrigation District, Terra Bella Irrigation District, Fair Oaks Irrigation District, Oakdale Irrigation District, Citrus Heights Irrigation District.

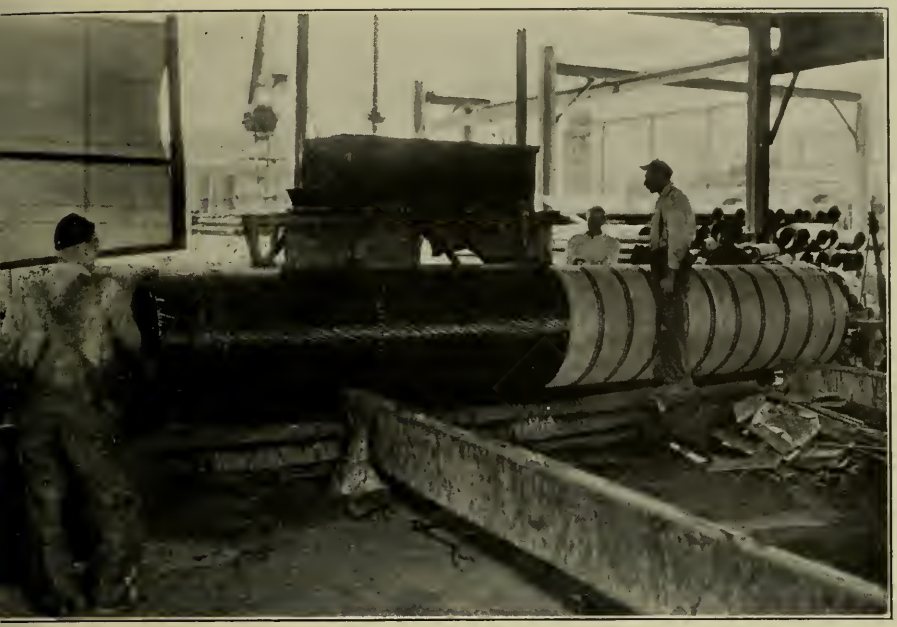
> In a recent issue of the Engineering News-Record, prominent engineers, both in this country and abroad, were quoted as saying that the day of cast iron pipe for large mains is over, and, further, that the use of steel pipe for large water distribution mains is just beginning. However, the latter statement is hardly fair to many engineers on the Pacific Coast, some of whom have for decades been using steel pipe exclusively for transmission lines, and in many cases for trunk lines in distribution systems.

In his annual report for the fiscal year, which ended June 30, 1929, Mr. Savage included the following outline of proposed work, to be progressed during the ensuing fiscal year:

"The voters of the City of San Diego, on July 16, 1929, authorized the issue of $2,350,000 municipal bonds for the purpose of carrying out certain work as proposed by th hydraulic engineer.

"The issue is divided into tw principal items: first, an item c $2,100,000, known as the Pipe Lin and Reservoir Bond Item, which wi include the construction of a secon main pipe line from Lower Otay res ervoir to the University Heights res ervoir; Morena reservoir dam an spillway and safe duty enlargemen (the work having been outlined b Mr. Savage in 1923), and the en largement of the Chollas Height dam and reservoir, in accord wit the present requirements for an ade quate standby water supply. Secon —an item of $250,000 known as th Acquisition and Investigation Bon Item, which will be used for the fur ther development of the city's pump ing features in the San Diego rive valley; for increasing the city' water filtration and purification fa cilities; for investigations, surveys engineering and legal work in con nection with proposed further devel opment of the Cottonwood branc of the Tijuana river and the con struction of the International Mar ron reservoir; for surveys, cor drillings, etc., at the Barrett reser voir in connection with the height ening of the Barrett dam; right o way and surveys for Morena an Barrett reservoirs enlargement investigations, research, surveys engineering and legal problems in connection with the San Diego river and the San Dieguito river.

"In addition to work to be accomplished with bond funds, the Bureau of Water Development's budget provides funds for the ensuing fiscal year for special improvement work on the various features of the city's water supply system. Work on these items will be advanced during the year as becomes necessary."



After the electrically welded steel pipe for the City of San Diego has been dipped in hot asphaltic compound, it will be wrapped in soil-proof covering. This operation is illustrated in the picture above.

This might be described as the "outbound" end of the heavy plate shop at the South San Francisco plant of Western Pipe and Steel Company. These sections of wrapped steel pipe are ready to be swung onto freight cars for shipment.

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WESTERN PIPE AND STEEL NEWS

N.E.L.A.
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SOUTHERN CALIFORNIA EDISON PENSTOCK NO. 2 [illegible]

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA
SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VII JUNE, 1930 NUMBER 3

Recent Additions to Big Creek-San Joaquin Hydro-electric Development of Southern California Edison Company, Ltd.

By O. J. SCHIEBER

[*Editor's Note:* In the November-December, 1927, issue of WESTERN PIPE AND STEEL NEWS a very comprehensive description of the Big Creek-San Joaquin Hydro-electric Development of the Southern California Edison Company, Ltd., was published under the signature of E. R. Davis, Manager of Construction. Since the publication of that article, two major additions have been made to the project: namely, Power House 2-A and a second unit in Power House 8. The following article was specially prepared by Mr. Schieber under Mr. Davis' direction.]

POWER HOUSE 2-A is located adjacent to Power House 2, and utilizes water from Shaver Lake at elevation of 5,370 feet through an 11 x 8-foot tunnel, 13,900 feet long, and a penstock 6,712 feet in length, and operates nder a static head of 2,418 feet. This plant has two 56,000 H.P. generators, ach driven by double-overhung impulse type wheel units. The generators perate at 11,000 volts, and the output is stepped up to 220,000 volts for ransmission to Los Angeles by a bank of three 30,000 K.V.A. transformers ocated immediately outside the power house building. After going through haver Tunnel the 589 second feet of water for Power House 2-A is carried own the mountain side in a single penstock for 6,222 feet to a point just bove the Power House, where it is split into two lines by a 66 x 48 x 48-inch vye-lateral. Each of these lines is again split by a 48 x 34 x 34-inch wye-ateral to supply water to the two impulse wheels of each unit. This pipe is 08 inches at the top and is gradually decreased to 66 inches at the first wye.

The upper end of the penstock for a distance of 460 feet is 108-inch diameter ipe and reduces to 102-inch just above the butterfly valve. The next 1,496 eet is riveted pipe, reducing from 102-inch to 84-inch. This 1,496 feet of enstock was furnished by Western Pipe and Steel Company of California. he plate thickness of the pipe to this point varies from ½-inch at the top o 1 3/16 inches at the bottom.

The upper 460 feet of this pipe was made up in 18- to 24-foot sections of our courses each with in and out girth joints double riveted and longitudinal oints were triple riveted butt with double strap. This pipe did not receive a hop coat of paint, as it is located in the outlet of the Shaver Tunnel and was oncreted in as soon as erected. The next 1,496 feet of pipe was made similar o the above with the exception of quadruple riveting in the longitudinal oints and section lengths being approximately 29 feet. This pipe was sand-lasted and received a coat of DuPont chromate metal primer on both the nside and outside surface before leaving the shop.

The next 3,034 feet of pipe below the riveted pipe is banded, forge-welded pipe.

Below the banded pipe, the remaining 2,182 feet of penstock was forged seamless pipe. From the ends of the banded pipe to the first wye (a distance of 1,692 feet) this pipe was 66 inches in diameter, and varied in thickness from 2½ inches to 3 inches, and was made in sections 20 to 25 feet in length with a maximum weight of 54,150 pounds. The balance of the forged pipe was 48 and 34 inches in diameter.

This penstock is located on a very steep slope, having a total fall of 2,240 feet in a horizontal distance of 6,016 feet. A standard gage incline operated by a 400 H.P. hoist had been previously installed to handle th equipment for Power House 2 an 2-A from the San Joaquin & Easter Railroad near the top of the penstoc This incline paralleled the penstoc for a portion of its length, and exte sions were made to parallel the uppe two-thirds, and the pipe was then d livered alongside and skidded t place in the penstock line. At th upper end it was necessary to insta an auxiliary incline and hoist, as th penstock extended some distanc above the main incline. For th lower 2,000 feet of penstock next t the Power House, which containe the heaviest sections, a gantry cran which straddled the penstock lin was used for delivering and placin the sections. The pipe sections wer

View of 2nd-unit penstock of power house No. 8 of the Southern California Edison Compan Big Creek development.

elivered by the main incline to the antry car by which they were deliv-red to location and lowered by chain locks to place in the line.

All the pipe of the various types sed in this penstock went together ı very good shape, which was of reat assistance to the erection under ıe difficult conditions of terrain and ıe heavy pieces which it was neces-ıry to handle.

The penstock is supported through-ut on concrete piers, and reinforced oncrete anchors are provided at all hanges in grade and alignment. Ex-ansion joints are provided between ll anchors. Two Johns-Manville as-estos packing sheets lubricated with raphite are provided at each pier to ıcilitate the movement of the pipe ue to expansion and contraction. 'he upper sheet is stuck to the pipe ith red lead and the lower one is emented to the pier with grout. On ıe banded pipe a curved plate was rovided to cover the bands at the ier locations, and the asbestos pack-ıg sheets were then used the same as ith the smooth pipe.

Work on the 2-A Project was tarted in June, 1926, and the first nit was placed in operation in Au-ust, 1928, and the second unit in)ecember, 1928.

econd Unit—Power House 8

OWER HOUSE 8 is located at the junc-on of Big Creek and San Joaquin iver, and is the next plant below 'ower Houses 2 and 2-A in the Big reek chain. It is supplied with ater coming from these two plants.

The additional storage facilities eveloped at Florence Lake in 1926 nd at Shaver Lake in 1927 provided sufficient water to warrant the instal-lation of a second unit in Power House 8. The tunnel from Power House 2, which tunnel is 5,630 feet in length, was constructed to take care of this additional unit so that it was only necessary to install another pen-stock and extend the Power House building to house the new unit.

This second unit, which has a ca-pacity of 45,550 H.P., operates under a static head of 715 feet and requires at full load 673 second feet of water.

The penstock is 2,691 feet in length, and varies in diameter from 120 inches at the top to 84 inches at the bottom. The pipe is riveted throughout and the plate varies in thickness from 7/16-inch at the top to 1½ inches at the bottom. A 10 x 10-foot slide gate is provided at the top with manual and remote control and automatic closing facilities, the same as described above for the 2-A pen-stock. An 84-inch butterfly valve is located at the lower end just next to the turbine.

The upper 919 feet of the penstock varies in size from 120 inches to 108 inches, with plate thickness varying from 7/16-inch to 11/16-inch. This pipe had Z bar stiffeners 6 x 3½ x ⅜-inch, spaced one to each course. The longi-tudinal seams are quadruple riveted double butt straps. The girth seams are double riveted single butt strap.

The next section of pipe, 1,170 feet in length, was made by the Western Pipe and Steel Company of Califor-nia. This pipe varies in diameter from 108 inches to 84 inches and in plate thickness from ¾ inch to 1 1/16 inches. The riveting was the same as de-scribed above with closer spacing and

Another view of 2nd-unit penstock of power house No. 8, Southern California Ediso Company.

ırger rivets. The pipe sections were ıade up in 30-foot lengths.

The remainder of the penstock ipe, 602 feet, next to the Power Iouse, is 84 inches in diameter and ·as made of very heavy plate varyıg in diameter from 1 1/16 inches to ½ inches. The rivets are counterınk on the inside to improve water ow conditions. The butt straps for eld erection were machined and tted in the factory. The length of ıe sections varied from 25 feet to 29 eet, the length being limited by a ıaximum allowable weight of 25 ons per section.

A standard gage incline railway imilar to the 2-A incline described bove already paralleled the penstock ocation as a result of the original onstruction at Power House 8. This ·as utilized to deliver the pipe secons alongside the penstock and ıey were then skidded to location in ıe line.

This penstock is supported on conrete piers and is provided with conrete anchors and expansion joints imilar to the 2-A penstock except hat the expansion joints are built up rom plates and angles instead of eavy forgings. The provision for liding on the piers is the same as decribed for the 2-A penstock.

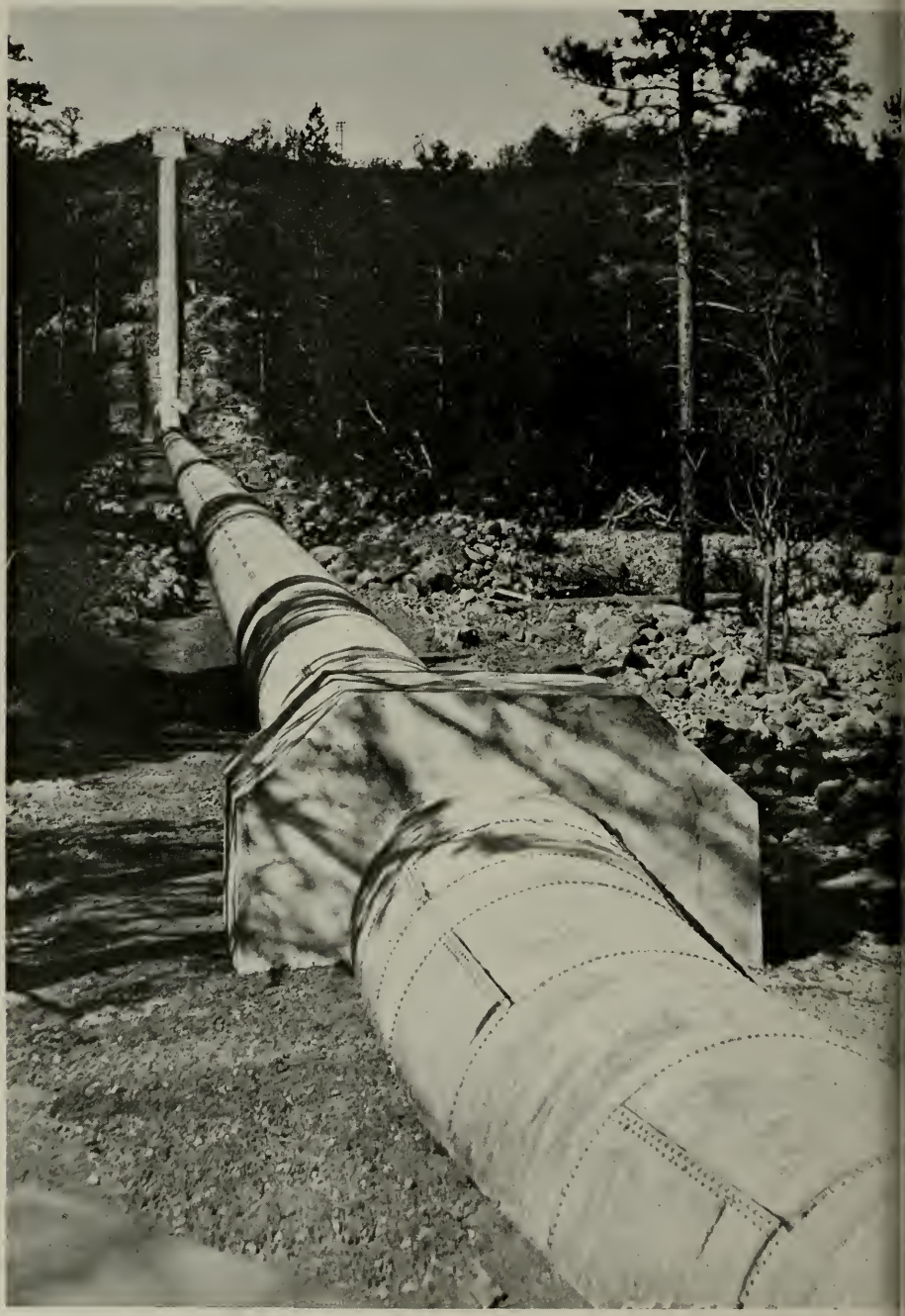
All of the pipe on this penstock ·as given a shop coat of bitumastic rimer on the inside and a coat of hromate metal primer on the outide after erection. One coat of bitunastic enamel was applied to the nside. This was applied at 400 degrees Fahrenheit and expansion oints were left open to provide adnission to the penstock at frequent ntervals. The enamel was elecrically heated in a 50-gallon insuated kettle or retort which was provided with automatic control so that it was possible to keep the enamel within a few degrees of the desired temperature. Insulated 14-quart buckets with electrical heating units in the bottom were used by the men in the pipe to carry the enamel and keep it up to temperature while applying. These buckets were provided with 750-watt, 110-volt, 3-heat units and it was possible to keep the enamel very close to the desired temperature. This electrical control of the temperature of the enamel greatly facilitated the painting and secured a very much smoother application than could have been obtained with uncontrolled heating, and without the electrically heated buckets to keep the bucket of paint at the desired temperature until it was all applied.

Work on this Second Unit of Power House 8 was started in May, 1928, and the Unit was placed in operation in June, 1929.

The two Projects described in this article were built by the Construction Department of the Southern California Edison Company, Ltd. All of the work except three small contracts was done by force account.

THE COVER PICTURE—Looking down hill along riveted steel penstock 2-A just above surge chamber at the outlet of tunnel No. 2, Southern California Edison Company's Big Creek development.

NOTE—That this issue of WESTERN PIPE AND STEEL NEWS is dated June (the last issue was February) is explained by the fact that the magazine is being issued quarterly instead of monthly as heretofore.



As pictures are not yet available of the Pacific Gas and Electric Company's Tiger Creek penstock, described on the opposite page, we are printing the above picture of penstock fabricated some time ago for Pacific Gas and Electric Company's Hat Creek power plant No. 3, of the Pitt River development.

Pacific Gas and Electric Company's Mokelumne Hydro-electric Project

As a part of its $40,000,000 program for hydro-electric development on the Mokelumne River, Pacific Gas and Electric Company is constructing, among other major works, a 60,000 K. V. A. power plant known as the Tiger Creek power house. The order for the fabrication of the penstock for this plant has been placed with Western Pipe and Steel Company of California and the work of fabricating at the South San Francisco plant of this company will begin shortly.

The penstock, which will have 1220-foot head, consists of approximately 440 feet of riveted steel pipe ranging from 102-inch diameter and 5/16-inch plate at the top, down to 78-inch diameter and 1½-inch plate at the bottom, where it branches into two 52-inch pipes, each of which branches again into two 36-inch pipes, each leading to an impulse wheel inside the power house.

The Tiger Creek power house is situated at the junction of Tiger Creek and the Mokelumne River. Its generating equipment will consist of two 30,000 K. V. A. generators connected to two double overhung 36,000 H. P. Pelton impulse wheels.

The Mokelumne hydro-electric development as planned will give the Pacific Gas and Electric Company an increase in power capacity of 146,000 K. V. A. A further increase of 25,000 K. V. A. will be made possible through proposed additional storage on the Bear River, which is the main tributary of the Mokelumne. When this development is completed the Mokelumne River will be utilized virtually to the limit of its power producing capacity.

Western Pipe and Steel Company in addition to the Tiger Creek penstock has also been called upon by the Pacific Gas and Electric Company to supply in connection with this development an inverted siphon of riveted steel pipe to be known as the Panther Creek siphon, and also an inverted siphon to be known as the Deer Creek siphon.

The Panther Creek siphon consists of 488 feet of 93-inch diameter riveted steel pipe, while the Deer Creek siphon consists of 870 feet of pipe of the same size.

The entire Mokelumne hydro-electric project was designed and is being constructed by Pacific Gas and Electric Company forces. A. H. Markwart, vice president in charge of engineering is supervising all engineering features and immediately in charge of the project are I. C. Steele, chief of the Division of Civil Engineering; Walter Dreyer, office engineer; G. C. Green, field engineer (J. D. Galloway served as consultant in connection with the design of the Salt Springs dam); J. P. Jollyman, chief of the division of Electrical Engineering and E. A. Crellin, chief assistant.

Construction work on the Mokelumne hydro-electric project is under the supervision of O. W. Peterson, engineer of general construction; Hector Keesling, chief assistant; P. I. Kurtz, field superintendent of Salt Springs dam works westerly to Bear River; G. M. Wehrle, field superintendent from Bear River to and including the corporation yard at Martell, the railroad terminus; J. E. Cooney, assistant superintendent in charge of flume construction; R. D. Reeve, resident engineer; and E. H. Steele, engineer of transmission line construction.

SHOP ASSEMBLY OF MANIFOLD FOR CITY OF TACOMA'S CUSHMAN NO. 2 PO
PROJECT.—*This huge manifold is 17′ diameter with three 10′ 6″ diameter branches. It is no*
a unique piece of riveted plate work but is the largest manifold ever manufactured as far as k
The picture was taken at the South San Fra

Western Pipe and Steel Company of California. The size of the workmen in comparison to ifold gives an interesting study in scale. Two of the manifold flanges are equipped with utterfly valves from which the twin penstocks lead. The third branch has a blind flange future requirement of the third penstock.

Western Pipe and Steel News

PUBLISHED QUARTERLY BY

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles

Edited by Richard Prosser

Once again Western Pipe and Steel Company of California joins in extending a welcome to members of the National Electric Light Association. San Francisco is signally honored in having so distinguished an organization as its guest for the second time within the space of a few years.

In the field of hydro-electric development, as well as in steam generating plants, great things have taken place in the last five years. Some of these major developments are featured in this issue of Western Pipe and Steel News. Most of this material has never been published before and we believe the descriptions of various developments as told herein by men directly concerned with the different projects will be of intense interest to our readers.

Western Pipe and Steel Company of California takes a just pride in its manufacturing leadership in connection with hydro-electric development and other utility projects on the Pacific Coast. We hope that the material herein set forth will prove both "illuminating" and "enlightening" to members of the National Electric Light Association.

Closeup of interior of three-way manifold for City of Tacoma's Cushman No. 2 project.

Large Surge Tank and Penstocks for Cushman Power Project, City of Tacoma, Washington

By J. V. Gongwer, Superintendent Hydraulic Design and Construction
Assistant to J. L. Stannard, Chief Engineer, Department of Public Utilities

CUSHMAN Power Plant No. 2, the second step of the Cushman Power Project, a development of the Skokomish River, on the Olympic Peninsula between Puget Sound and the Pacific Ocean, is now well under construction.

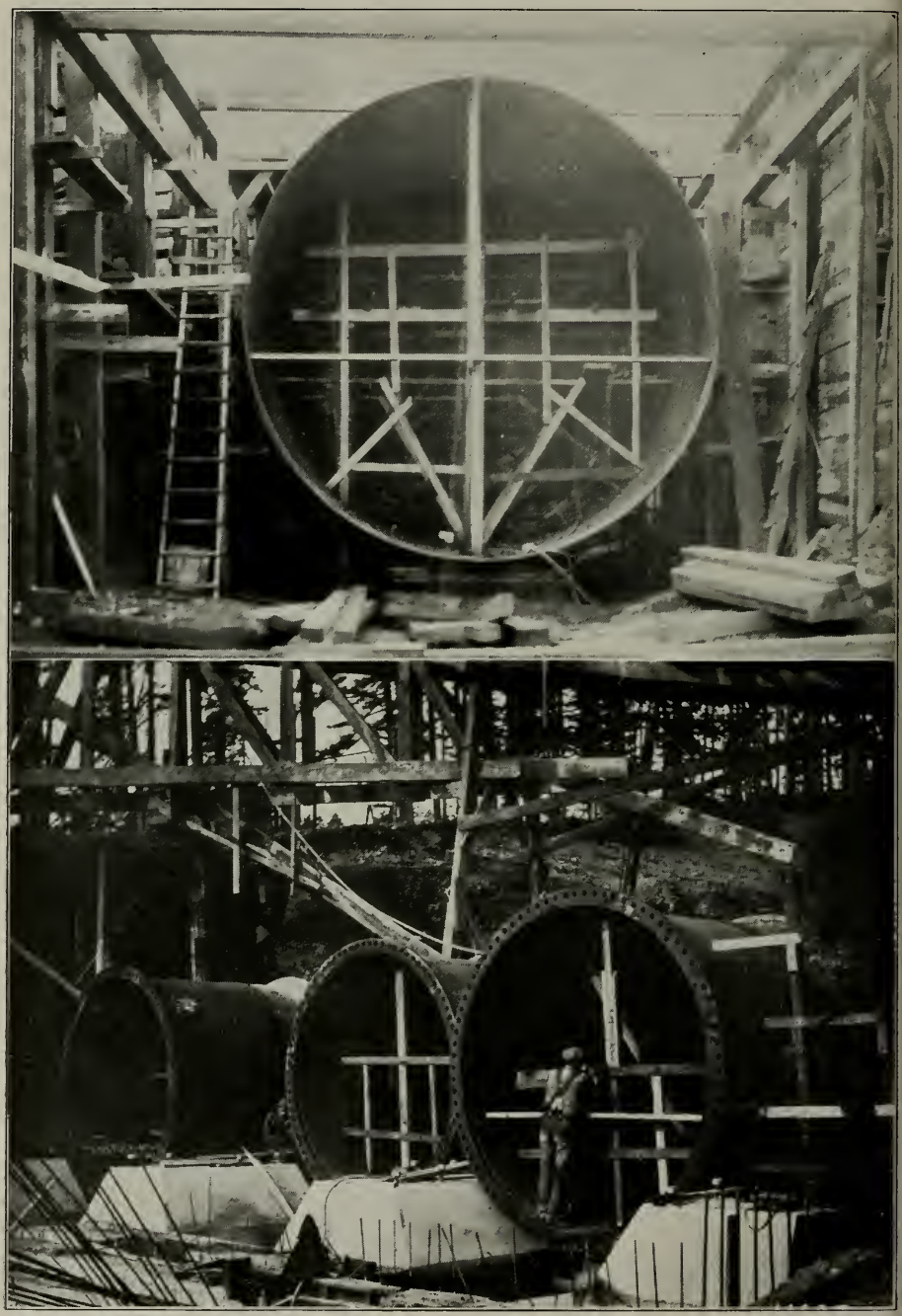
Power Plant No. 1, the first step, completed in 1926, consists of Cushman Dam No. 1, a constant angle arch dam 280 feet high, inundating former Lake Cushman and creating a reservoir of 440,000 acre feet capacity, together with a short pressure tunnel and Power House No. 1. The runoff from a drainage area of 92 square miles produces a regulated flow of 800 cubic feet per second which is dropped from a maximum reservoir level of 735 feet above sea level to tail water at elevation 480, the power house being equipped with two vertical generating units consisting of 25,000 H.P. reaction turbines and 20,000 K.V.A. generators.

The second step of the development, or Power Plant No. 2, comprises Cushman Dam No. 2, a simple arch diversion dam 240 feet high, situated about two miles farther down the river and impounding water at tail water level of Power House No. 1; Cushman Tunnel No. 2, at 17-foot diameter concrete lined tunnel 13,000 feet long, conducting the water from the valley of the Skokomish to the edge of the plateau above Hood Canal; a steel differential surge tank; a three-branch manifold; and two steel penstocks dropping the water down to Power House No. 2, to be discharged at tide water into Hood Canal, an arm of Puget Sound, developing a gross head at this point of 480 feet. The Power House is being equipped with two vertical units consisting of 37,600 H.P. reaction turbines and 30,000 K.V.A. generators, with provision for a future third unit should the South Fork of the Skokomish be diverted into Reservoir No. 1.

A constant operating head of approximately 450 feet will be developed at Power House No. 2 with three units at full load. Construction is being rushed on all parts of this work simultaneously to complete it during the current year. Extremely interesting features of construction are the surge tank, manifold and penstocks, the first two being, so far as known, the largest of their kind ever constructed.

Western Pipe and Steel Company of California has the general contract for furnishing and installing all steel plate work involved, as well as the 10′-6″ diameter butterfly valves, valve house, piers, anchors, and encasements. The quantities of materials required for this portion of the project were approximately as follows: steel work, 2200 tons; castings, including valves, 60 tons; concrete, 5500 cubic yards; reinforcing steel, 155 tons.

The penstocks and surge tank were fabricated by Western Pipe and Steel Company at their South San Francisco plant with the exception of the



City of Tacoma's Cushman No. 2 project. Above, the 17′ diameter steel tunnel liner at the outlet of the 13,000′ tunnel. Below, the 3-way manifold with 10′ 6″ outlets, which is connected to the 17′ steel tunnel liner.

1⅛″ and 1$\frac{1}{16}$″ plate sections at the lower end of the penstocks, which were fabricated under subcontract by the Commercial Boiler Works, Seattle.

The surge tank is the differential type, 65 feet in diameter and 94 feet high, rising to an elevation of 518 feet, or 38 feet above reservoir level. The bottom of the tank is connected by a 16′-2″ diameter tee to the 17′-0″ diameter steel liner which extends back into the tunnel 100 feet from surge tank and through beneath the tank to the manifold. A 14′-6″ diameter riser pipe is suspended in the tee by brackets, thus forming the requisite port openings.

Exhaustive studies and estimates were made to establish the most desirable and economic relations between diameter of tunnel and size of surge tank. The cost of tunnel reinforcement and value of head loss as well as effectiveness in damping surges were the most important considerations. The tank consists of 11 courses, the plates varying in thickness from 15/16-inch at bottom to ⅜-inch at the top, the standard size of plates being 9′-0″ x 20′-5″. Quintuple riveted joints are used in lower courses of plates. The bottom of the tank is of 5/16-inch plate resting upon a cushion of cement and sand.

The tank is equipped with a footbridge connecting the rim of tank with top of riser, ladders inside and out, painter's trolley, and manholes.

The 17′-0″ diameter steel liner passes from the tunnel through under the tank, being cast in concrete integral with the heavy reinforced slab forming the tank foundation.

At the end of liner is constructed a steel manifold with three 10′-6″ diameter branches with cast steel flanges. This manifold is a unique piece of riveted plate work and the largest of its kind known. It is also solidly cast in heavy reinforced concrete, one of the principal considerations here being permanence and stability, as insurance against any possible damage to the penstocks which lie on a moderately steep gravelly slope with the power house and outdoor electrical installation below.

10′-6″ butterfly valves were installed on two of the manifold branches at this time, the third branch being equipped with a blind flange, and the valves being enclosed in a sightly concrete valve house, superimposed on Anchor No. 1, from which the penstocks dip down the hill.

Downstream from the butterfly valves, 42-inch vent pipes 124 feet in height, rise vertically on top of penstocks, the third pipe being installed at this time in order that the three pipes may be braced to form a self-supporting tower.

The penstocks vary by 3″ decrements from 10′-6″ diameter and 7/16″ plate at upper end, to 9′-0″ diameter and 1⅛″ plate at lower end, connecting to turbine inlet valves by a reducer section and one length of 8′-0″ diameter pipe. The 7/16″ plate sections have one stiffener angle each.

The penstocks are 1350 feet long, spaced 15 feet apart on centers, and supported on concrete saddle piers at 27-foot centers measured along the slope, with heavy concrete anchors approximately 300 feet apart at changes in grade. Between each two anchors is placed an expansion joint of the sleeve type with packing gland, ten rings of square graphited flax packing and alemite fittings.

At each bearing on saddle piers the

pipe is reinforced with a 5/16″ sole plate welded thereto, and two three-inch steel oil channels are cast in tops of piers to reduce friction. On each side of the piers the pipe is stiffened by 6″ x 4″ x ⅜″ angles while two 5″ x 5″ x ⅝″ angles are riveted to the pipe at each anchor to be cast in the concrete.

The lower ends of the penstocks pass horizontally beneath the switch and transformer yard to the power house and here the pipes diverge to the turbines and are encased in concrete between the last two anchors on each line.

The pipe sections came upon the job in complete 9′-0″ lengths consisting each of a single plate, with longitudinal seams fully riveted. Longitudinal joints are quadruple riveted with double butt straps, while girth joints are double riveted with outside butt straps, also in one piece. The greater part of the pipe was hauled to the surge tank site over excellent roads constructed and maintained by the city, unloaded from trucks by stiff-leg derrick and lowered down the incline on wooden skid boat by line from derrick with assistance from second hoist located farther down the slope, which hoist was also used to assemble pipe from a wooden gantry frame spanning both pipes and moving on skids.

No particular difficulties were involved in erecting the pipe lines as the maximum slope is 24°. Considerable difficulty, however, was met in constructing the base of the anchor at foot of incline on account of ground water which had to be pumped continuously from date of first excavation operations. Upon completion of the work this water will be picked up in collecting drains approximately four feet below grade.

Looking down the twin penstocks line to the site of Cushman power house No. 2.

f switch and transformer yard and onducted to tide water by two 24″ rains already installed.

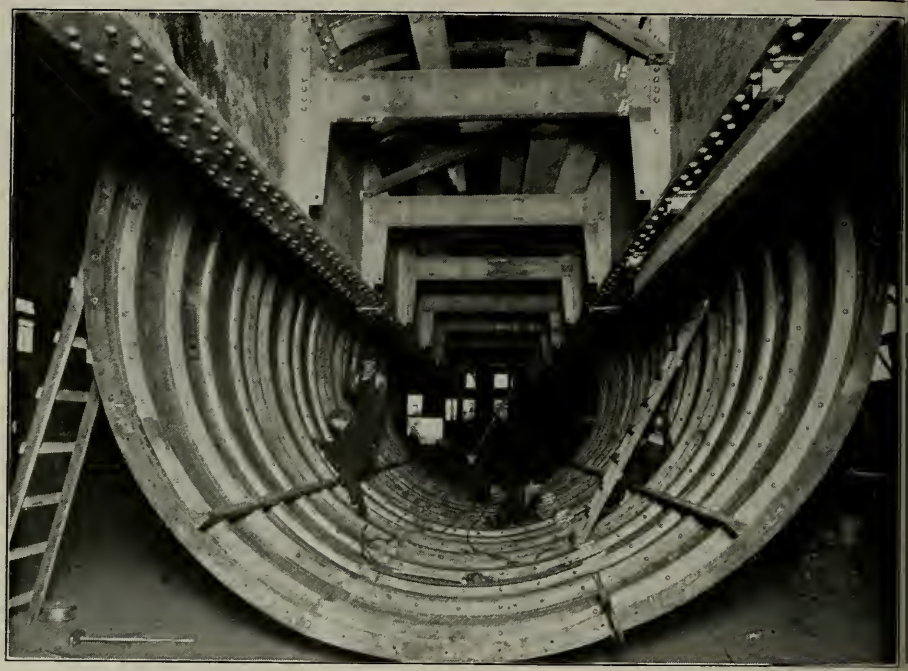
Testing will be done in approximately 300-foot sections between expansion joints, the testing pressure eing at least 35% in excess of the tatic head upon the upper end of the ection tested, based upon an assumption of water level at top of urge tank at elevation 518.

Excessive water hammer is avoided hrough the use of relief valves installed with each turbine, which alves are directly connected mehanically to gate shifting mechansm and governors, opening positively nd in synchronism with the closing f gates and closing slowly on dashot, or closing rapidly in synchronsm with any opening motion of ates. These relief valves have 100% apacity for the 900-second-foot naximum water demand of each urbine.

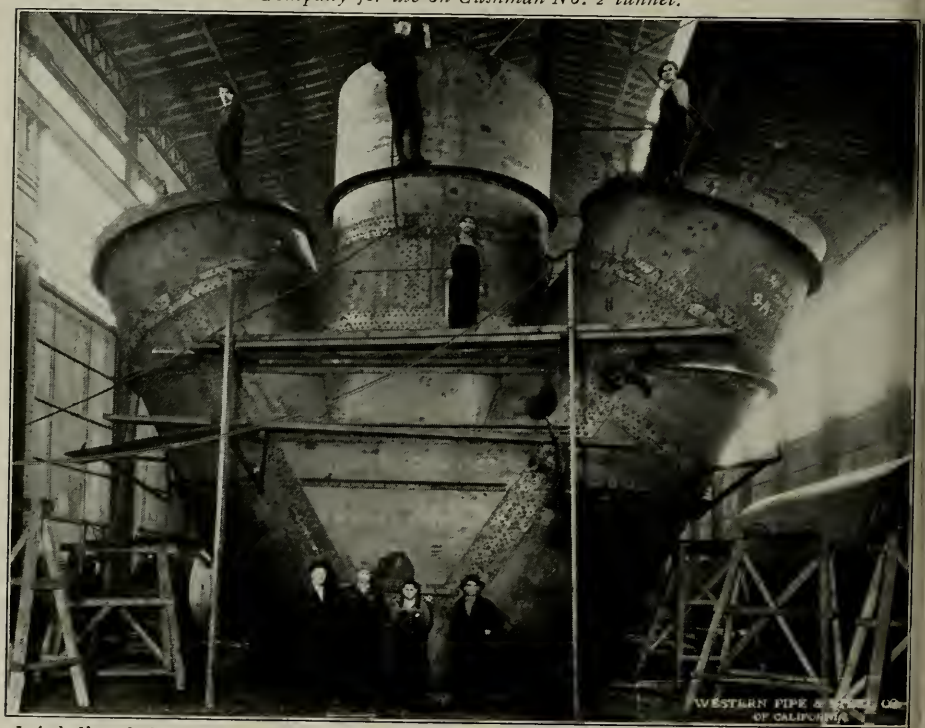
Youdall Construction Co., general contractors for the construction of Cushman Tunnel No. 2, 13,000 feet long by 17 feet in diameter, for whom Western Pipe and Steel Company of California furnished the steel tunnel forms, are also constructing the piers, anchors, encasements, etc., under subcontract from Western Pipe and Steel Company. The latter company subcontracted the erection of the penstocks and surge tank to the Gabriel Construction Company.

The work is progressing favorably and rapidly under the direction of the Western Pipe and Steel Company and the supervision of John G. Heinz, Resident Engineer for the City of Tacoma. The writer is entrusted with supervision of design and construction of the entire plant, exclusive of generating and other electrical equipment which are in charge of A. F. Darland, Superintendent of Electrical Design and Construction, all being under the direction of J. L. Stannard, Chief Engineer.

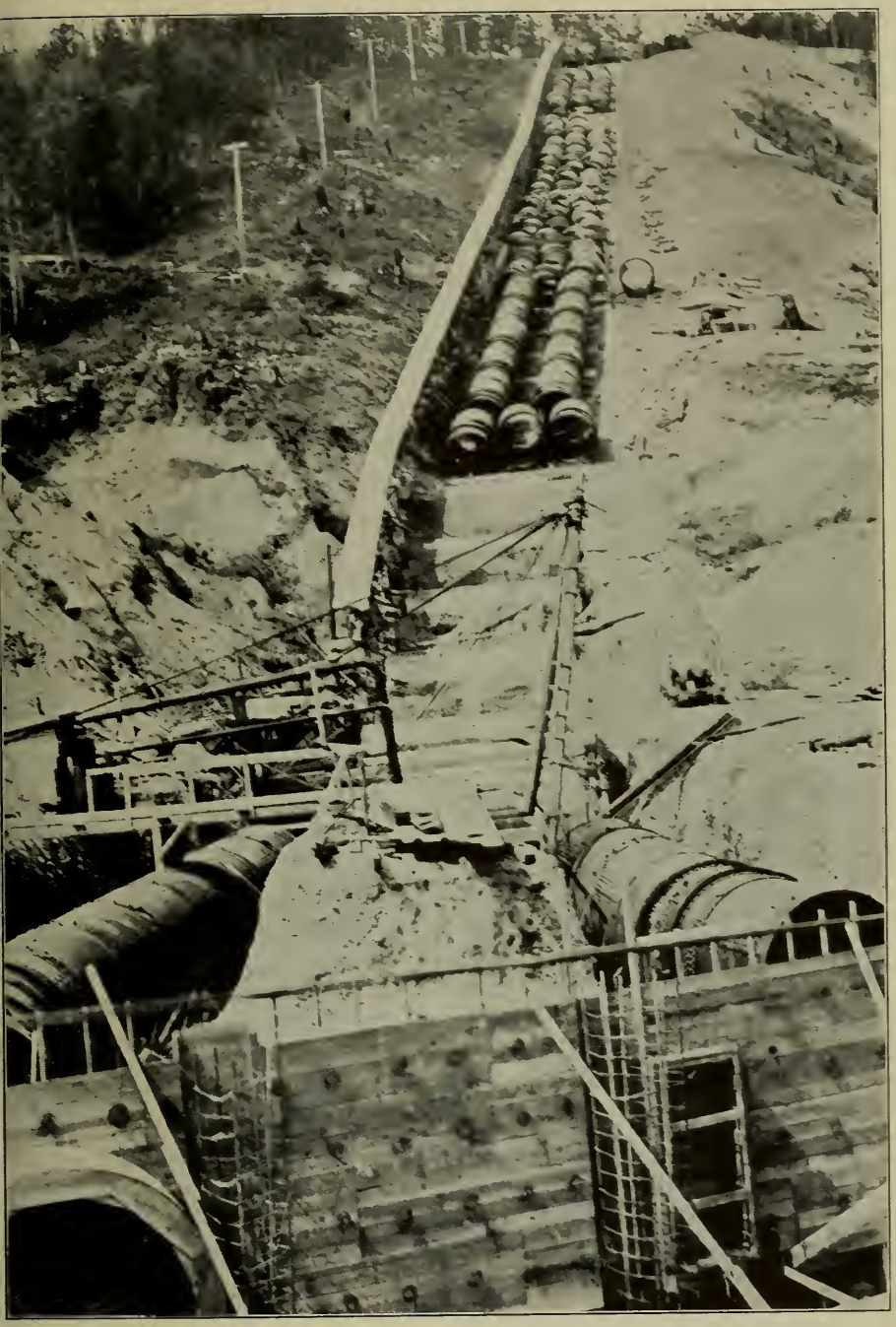
Surge tank showing first course in place. The tank is 65′ in diameter and will be 94′ high.



Steel tunnel form fabricated by Western Pipe and Steel Company for Youdall Construction Company for use on Cushman No. 2 tunnel.



It is believed that this manifold is the largest ever constructed. The large end is 17′ in diameter and the three outlets are 10′ 6″.



INSTALLING PENSTOCK FOR CUSHMAN NO. 2 POWER PLANT, CITY OF TACOMA.—*These twin penstocks, fabricated by Western Pipe and Steel Company of California, are 10′ 6″ in diameter at the top and 9′ in diameter at the lower end. The penstocks are 1350′ long.*

Unquestioned Responsibility in Shop and Field

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WESTERN PIPE AND STEEL NEWS

CITY OF SAN DIEGO

SAN DIEGO, CALIFORNIA

WATER DEVELOPMENT DEPARTMENT
HIRAM NEWTON SAVAGE
Hydraulic Engineer in Charge

Offices: 524 F Street

FRED D. PYLE, Engineer
J. W. WILLIAMS, Engineer
R. C. WUESTE, Supervisor
F. M. STANLEY, Accountant

November 24, 1930.

The sixteen mile reach of 40"-35" steel plate electric welded pipe ... contract work has been executed to the satisfaction and with the approval of all of the City's Inspectors, Resident Engineer, and in my personal knowledge, based on frequent inspection, has been carried on and out in a prominently efficient and satisfactory manner.

Based upon the visits paid by many engineers from near and far away places, the work has attracted unusual attention and I have heard only favorable comments from visiting engineers on the type and quality of work... The character and reliability of the welders was very outstanding as demonstrated by the practical absence of leaks or even sweats.

Very truly yours,

H. N. Savage,
Hydraulic Engineer

HNS/f

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

VOLUME VII 4th QUARTER, 1930 NUMBER 4

Western Pipe & Steel Co. Receives High Praise on Completion of 16-Mile Steel Pipe Line for City of San Diego

By Hiram Newton Savage

Hydraulic Engineer in Charge

Water Development Department

WESTERN PIPE & STEEL CO. OF CALIFORNIA completed in mid-November, and the City of San Diego accepted and immediately put into full commission, the Otay Reservoir—San Diego Second Main Pipe Line, which extends from the filter plant at Lower Otay Reservoir (see illustration on inside back cover) and the University Heights reservoir. The pipe line consists of the following quantities:

22,500 ft.—36″—$\frac{3}{16}$″; 13,000 ft.—36″—¼″; 1,900 ft.—36″—$\frac{5}{16}$″; 2,900 ft. 36″—⅜″; total, 43,300 ft.—36″ pipe; 30,600 ft.—40″—$\frac{3}{16}$″; 7,500 ft.—40″—¼″; 7,300 ft.—40″—¼″ (in tunnels); 760 ft.—40″—$\frac{5}{16}$″; total, 43,160 ft. 40″ pipe. Total length, 86,460 feet.

H. N. SAVAGE

The sixteen mile reach of 40″-36″ steel plate electric-welded shop and field joints, asphaltum dipped, roofing felt wrapped, contract work has been executed to the satisfaction and with the approval of all of the City's Inspectors, Resident Engineer, and in my personal knowledge, based on frequent inspection, has been carried on and out in a prominently efficient and satisfactory manner.

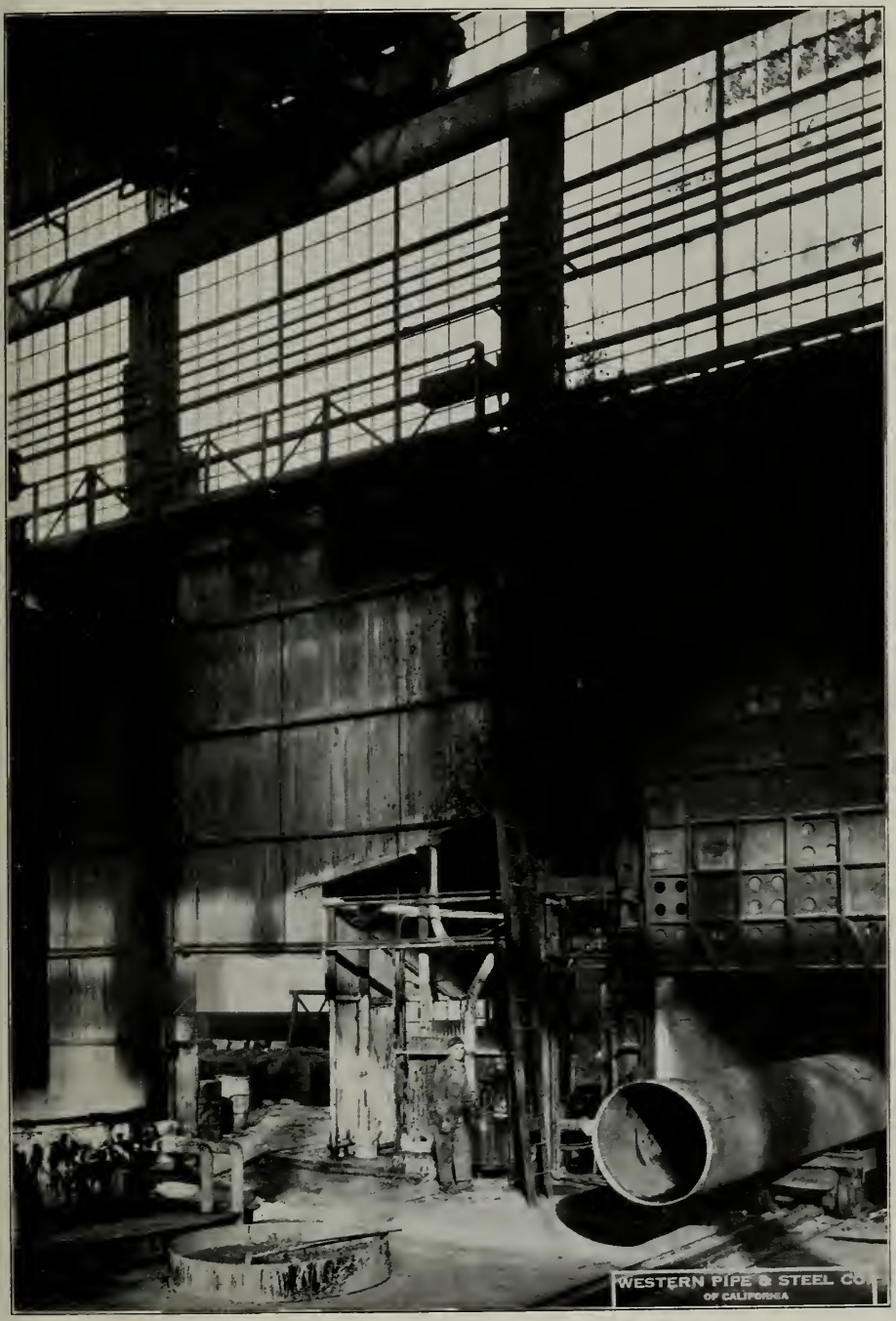
Based upon the visits paid by many engineers from near and far away places, the work has attracted unusual attention and I have heard only prominently favorable comments from visiting engineers, on the type of

work and quality of work performed in electrically welding both shop and field joints.

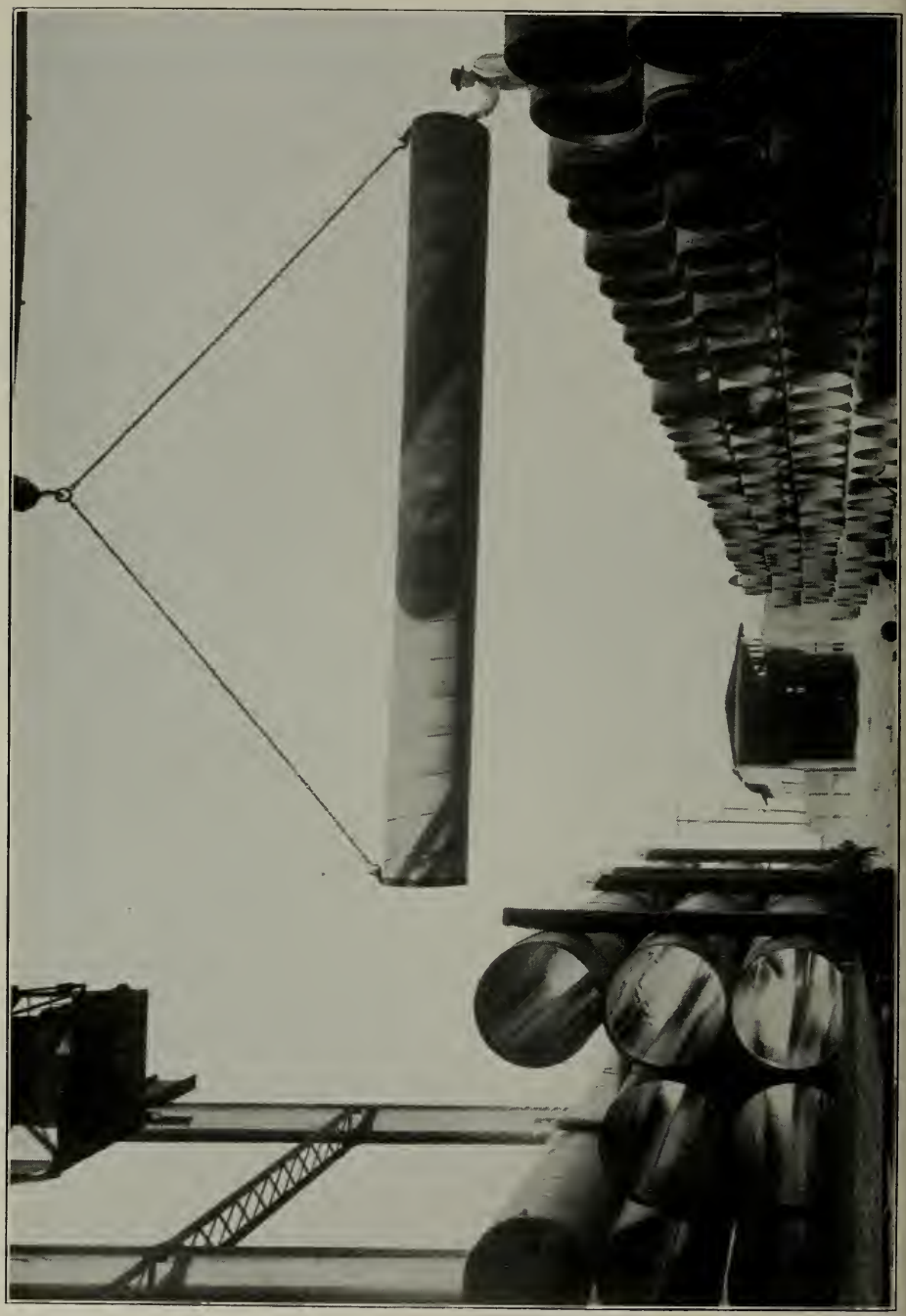
The pipe was tested in reaches of one/two miles as installation progressed, leaks were practically absent and only a few sweats appeared. The character and reliability of the electric weld seam welders was very outstanding, as demonstrated by the practical absence of leaks or even sweats in any material number, as the pipe was first tested.

The pipe line was put into full commission and was for local reasons absolutely depended upon to supply the City full water requirements immediately the first temporary connection was made with the outlet tunnel pipe discharge from the Lower Otay Reservoir, and has been in continuous service ever since, bringing in approaching once and one-half as much water as had been the carrying capacity of the previous pipe line, and enabling the City to discontinue the operation of its several pumping plants which have been necessarily operated since 1928, inclusive, to pump lift emergency water from the subsurface water-bearing sands in the San Diego River Valley, due to the limited carrying capacity of the City's first Otay Reservoir—San Diego main pipe line. *(Continued on Page 5)*

Every section of the steel pipe was given a hydrostatic test in the shop sufficient to develop a tensile stress of 17,000 pounds per square inch.



Placing a section of steel pipe in the preheating oven prior to its immersion in the dip kettle. At the extreme left a section is being lifted from the kettle.



View at Western Pipe & Steel Co.'s South San Francisco plant showing method of loading pipe

(Continued from Page 2)

Because the specifications covering the fabrication and the installation of the City of San Diego's Otay Reservoir-San Diego Second Main Pipe Line embody some very interesting features, and because they were based on an intensive study by the City Hydraulic Engineer, of other steel pipe lines, it is deemed appropriate to publish a large part of the specifications in connection with this article.

The writer, who was responsible for the specifications, made a special study and investigation during the past five years, not only of the various types and the performance of electric welded steel pipe for the transmission of water, but also pipes made of other materials such as cast iron, and concrete. The fact that this five year investigation resulted in the selection of electric welded steel pipe for the San Diego project makes it apparent that this type of pipe was deemed to be the best suited for the purpose at hand.

The specifications provided for the pipe to be made in sections not less than 24 feet in length without intervening circular seams, and not more than two longitudinal seams, except on curves. The longitudinal seams were to be formed by the automatic electric welding process. A longitudinal joint efficiency of at least 90% of the strength of the plate was required.

The circular seam joints for connecting the sections were to be made by belling the butt-end sections. The circular joints were to have a minimum lap of 1 inch. These circular joints were to be electric welded on the outside

This view shows method of telescoping 40" pipe through concrete lined tunnel 5½' x 6½'. This method proved both satisfactory and economical.

only, excepting pipe for telescoping through tunnels, fabricated angles and special sections, which were to be welded both inside and outside.

After award and execution of the contract to the Western Pipe & Steel Company of California, they voluntarily offered, without extra cost to the City of San Diego, to upset the edges of the 3/16″ and 1/4″ steel plates prior to welding the straight seams. This offer was gladly accepted by the City and resulted in obtaining the longitudinal joint in the 3/16″ and 1/4″ pipe, having similar characteristics to the weld made in the 5/16″ plate, and insuring a longitudinal joint efficiency of over 100%.

The profile of the Otay Reservoir-San Diego Second Main Pipe Line contained a most unusual number of horizontal angles, vertical angles and curves. This condition was taken care of in the specifications by providing for the use of a number of short sections which were welded together in the field to suit conditions, and thus eliminated the necessity of purchase and installation of a large number of shop-fabricated angles and special sections, all of which effected a considerable economy of cost to the City and an increase of hydraulic efficiency.

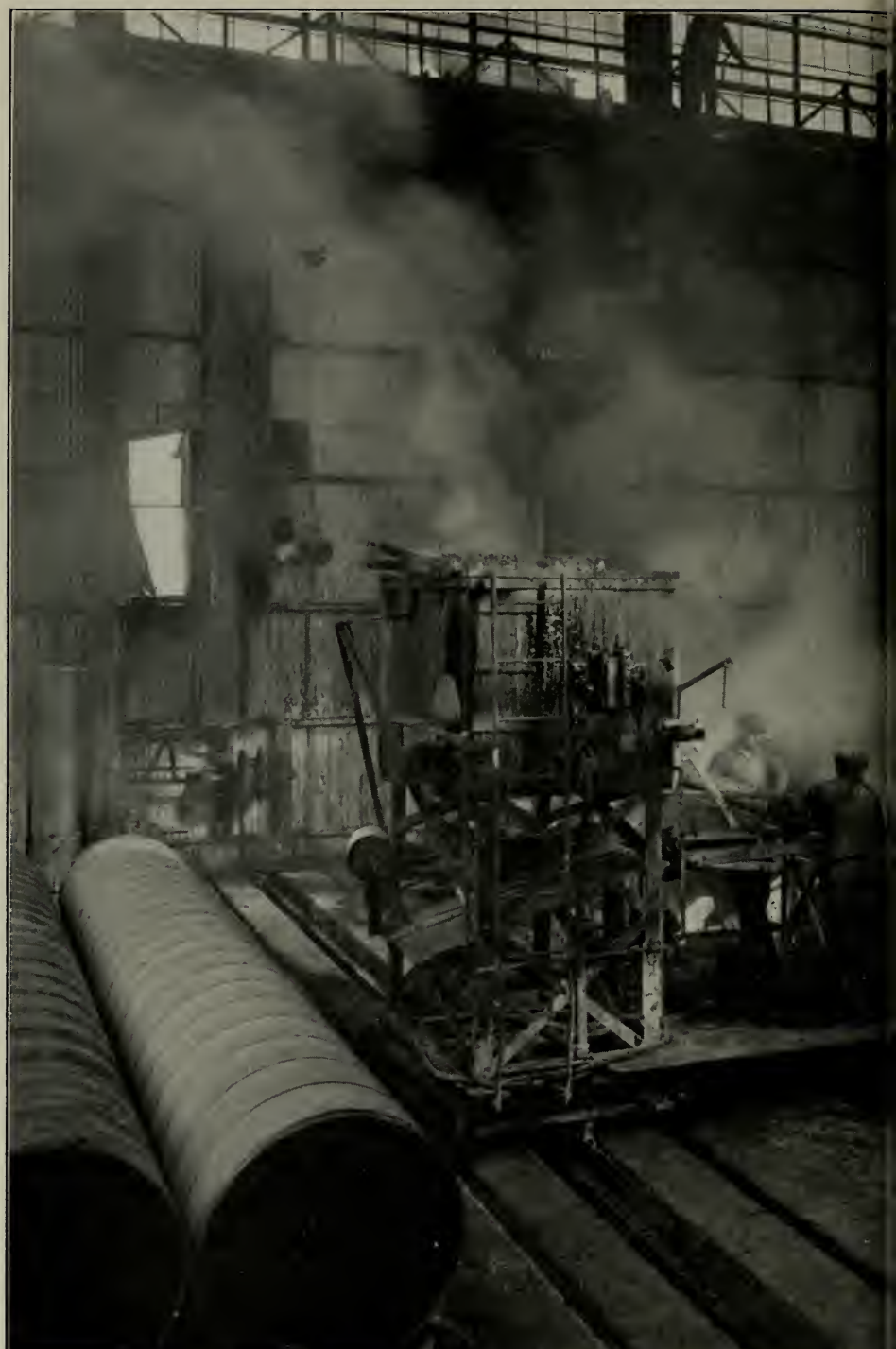
All pipe was tested in the shop by subjecting it to a hydrostatic test under internal pressure sufficient to develop a tensile strength of 17,000 pounds per square inch of plate. The field test specifications required a hydraulic test with internal pressure equal to that produced by 150% of the maximum water pressure static head in the section being tested. Inspectors reported that very few leaks were disclosed during the shop test and that during the field test no leaks whatever developed in the shop-tested seams, with the exception of a very few within the first inch or two from the butt end of the pipe. The field test revealed less than one leak per mile of pipe tested, with but few sweats or water-moistened welds, which could hardly be called "leaks."

Telescoping the 40″ pipe through the 5½x6½ feet concrete lined tunnels has proven both satisfactory and economical.

The City's Resident Engineer in charge of the installation of the pipe for the City of San Diego between Otay Reservoir and the City and the several Inspectors of fabrication at Western Pipe & Steel Company's South San Francisco Shops; and of assembly, welding and testing in the field have all been pronounced in their expressions of satisfaction not only with the Contractor's compliance with the specific provisions of the drawings and specifications, but with the contractor's cooperation in solving the few small problems which were inevitable in a job of this character and magnitude, and particularly in consequence of the unusual and pronounced irregular topography of the ground along which the pipe has been installed. An abstract of the specifications follows:

(Continued on Page 11)

An inspector checking the work of a welder on field joints, San Diego pipe line. Inspectors and engineers reported almost total absence of leaks or even sweats in the entire sixteen miles.



WESTERN PIPE & STEEL CO.'S SOUTH SAN FRANCISCO PLANT.—*Close-up view o dipping and wrapping department. At the extreme right is section of 40" electric welded ste coming out of the vertical dipping kettle. Agai*

wall stand seven sections that have already received their protective coating. On the wrapping ne the operation of applying soil-proof covering is nearing completion. Detailed specifications ng these operations will be found in this issue.

Western Pipe and Steel News

PUBLISHED QUARTERLY BY

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles

Edited by Richard Prosser

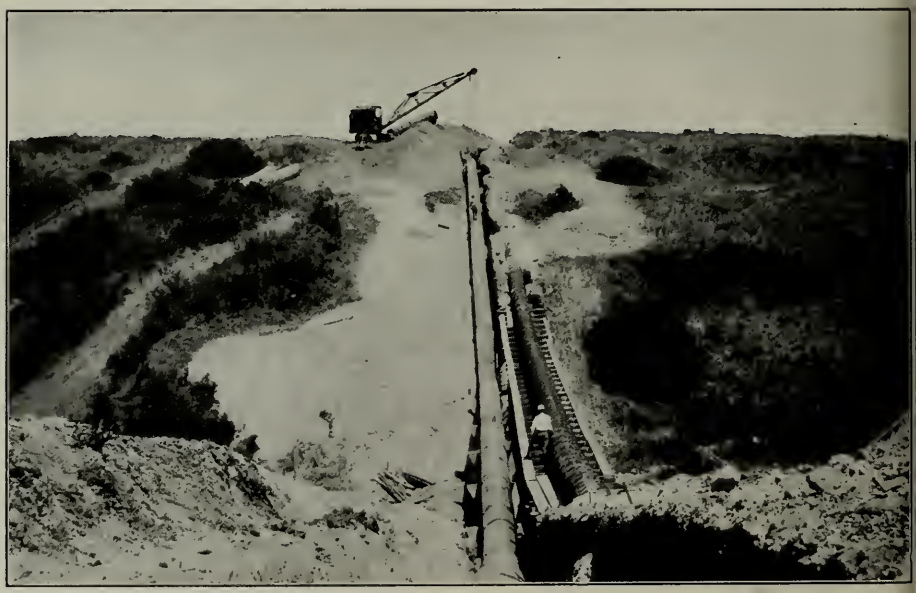
It is with much pleasure that we publish in this issue an article by Mr. Hiram Newton Savage. Throughout the months our shop and field forces have been engaged in the fabrication and installation of the 16-mile electric welded pipe line, our relations with Mr. Savage and his staff have been most pleasant. That these relations were mutually satisfactory we know on the one side from our own experience and on the other from the complimentary things expressed by Mr. Savage in his article.

We coincide entirely with the San Diego Union, which newspaper, in its leading editorial of November 25 said: "The people of San Diego have a right to feel the utmost confidence in Mr. Savage's assurances as to the cost, safety and yield of any water development he proposes."

Engineers will be quick to note the significance and the direct connection between two statements in this issue.

The first is Mr. Savage's explanation that his specifications were based upon a five-year investigation, not only of electric welded steel pipe, but also of pipe lines of cast-iron and concrete. As he points out, the selection of electric welded steel pipe makes it apparent that this type of pipe was best suited for the purpose.

The other significant fact is found in his statement that field tests showed practically no leaks and very few sweats in the entire 16-mile line. That speaks volumes for the efficiency of this type of pipe.



This view of the installation of the new San Diego pipe line shows the rugged character of the terrain. Also the old wood-stave pipe line which the welded steel pipe replaced.

ABSTRACT OF SPECIFICATIONS

Steel for Pipe. The steel plates used for the manufacture of the pipe shall be made f steel conforming in all respects to the Standard Specifications for Steel Plates of Flange Quality for Forge Welding, Grade B Serial Designation: A89-27, of the American Society for Testing Materials. The thickness of the steel plates shall be as designated by the engineer and the diameter of the pipe shall be the minimum inside diameter hereof.

Length of Section. The pipe shall be made in sections not less than twenty-four (24) feet in length, without intervening circular seams and not more than two longitudinal seams, except on curves.

Longitudinal Seams. Longitudinal seams shall be formed by the automatic electric welding process. Longitudinal joints shall be parallel to the axis of the pipe and shall have an efficiency of at least 90 per cent of the guaranteed strength of the plate forming the pipe barrel.

Circular Seams. The joints used for connecting the sections shall be of the straight bump type, or may be made by tapering the sections and lapping the circular joints a minimum of one inch. The joints shall fit accurately and properly. The plates shall be sheared with rectangular edges and the sections shall be jointed by outside electric fillet welds except all fabricated angles and special sections and all pipe placed in tunnels shall be joined by both inside and outside welds, and the pipe and the fillets shall be satisfactory to the engineer. The ends of all sections shall be properly cut to true lines and all shearing shall be neatly and accurately done so as to leave the plates free from ragged edges. At the junction of the circular and longitudinal seams the welding beads shall be removed and sufficient end welding done to fully reinforce all joints so as to permit a perfect joining to be made. The contractor may make a reasonable number of acetylene gas welds in laying the pipe and joining sections of pipe laid, provided that advance approval of the engineer is secured, and welding is performed to his satisfaction.

Short Sections. Where horizontal and/or vertical angles or curves occur in the pipe line that can be made with not more than five degree angles at circular seams using sections not less than six feet in length, the contractor shall furnish and install such short sections and weld such additional circular seams.

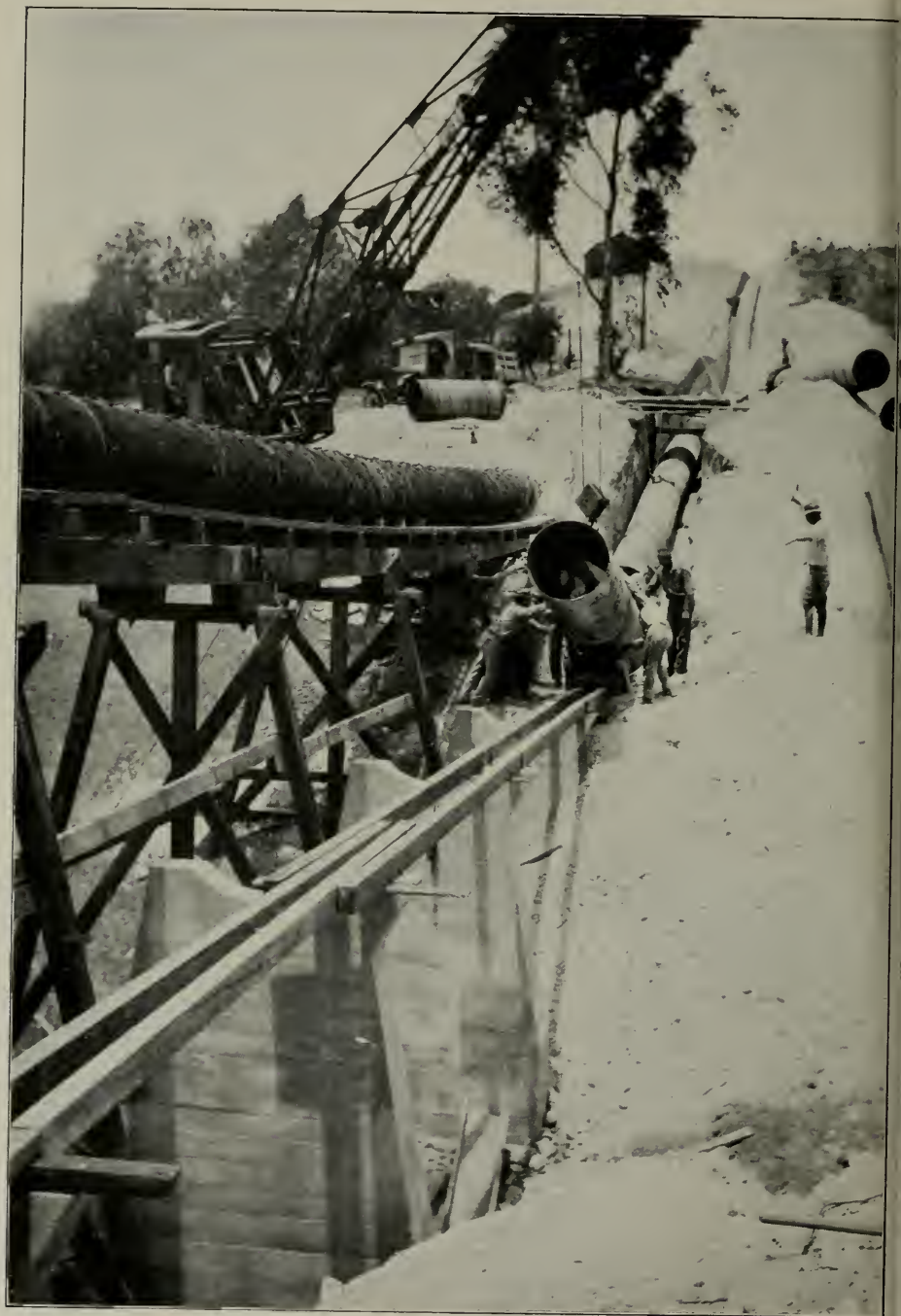
Fabricated Angles. Where either horizontal or vertical angles or curves occur in the pipe line that cannot be made as provided for in the above paragraph the plates shall be cut to courses to form the deflection angle required and the sections fabricated as designated by the engineer. The courses shall be so assembled as to bring all longitudinal seams as near the horizontal diameter of the pipe as possible.

Special Sections. Reducers, tees and wyes shall be furnished and installed according to the drawings or as directed by the engineer. All longitudinal seams shall be as near the horizontal diameter of the pipe as possible. Flanges where required shall be cast or forged steel.

Crimping and Rolling. The longitudinal edges of the plates shall be crimped, pressed, or otherwise formed to a true diameter before rolling. The plates shall then be cold rolled to the true cylindrical surface of the pipe sections without hammering.

Character of Welding Machine. The welding shall be done with an automatic electric welding machine designed specifically for the welding of the kind of pipe covered by these specifications. The engineer shall be the judge of whether the type of welding machine to be used in the work is satisfactory for the purpose. A satisfactory type of machine and character of beads deposited by it are described in succeeding paragraphs. If the bidder proposes to use any other type of machine he shall submit a full description

(Continued on Page 13)



Installation of San Diego's new welded steel pipe line with pipe coming from hillside trench and carried across a ravine on concrete piers. Old wood-stave pipe line at the left.

(Continued from Page 11)

ıereof and of the welds made by it, with his bid in connection with the Bidder's Ref-ences and Statement of Experience sheet.

Materials for Welding Rods. The steel welding bars or rods shall be of material ıtisfactory to the engineer and shall be thoroughly cleaned of rust and mill scale before se in the welding machine. The dimensions of these welding bars or rods shall be suffi-ent to provide the proper bead on each side of the weld.

Assembly and Alignment of Plates for Welded Pipe. The plates forming each sec-on of pipe shall be sheared, or planed, rolled to a true semi-circular form of the required iameter, thoroughly cleaned of all loose mill scale, rust, grease and other foreign sub-ances, and then so assembled that the maximum off-set between the edges of the plates long each longitudinal joint shall not exceed 1/16 of an inch, and that the space between nem shall not exceed 1/8 of an inch. The plates shall be held firmly in this position and ıck-welded at sufficient intervals to hold them securely and firmly during the process of elding. All tack-welds shall be burned through and fused during the welding process, r otherwise made satisfactory to the engineer.

Burrs. The inner surface of the pipes shall be free from burrs and other irregulari-ies resulting from welding other than the normal bead which will be necessary for each articular thickness of pipe. Any burrs over 1/8 of an inch in height on the inside of ıe pipe or more than 1/8 of an inch on the outside thereof, shall be chipped or ground ff to give a reasonably smooth surface and to coincide with the normal bead for the ıickness of the pipe welded. The engineer shall have the right to insist upon the removal f these burrs.

Beads. The minimum outside bead shall not be less than twenty-five per cent of ıe thickness of the plate. The minimum bead on the inside of the pipe shall be con-nuous throughout the length of the pipe and shall have an altitude of at least 1/32 of n inch and a base equal to about twice the altitude. Whenever either bead does not onform to the above requirements, the seams shall be chipped out to a sufficient depth) cut into solid weld metal and this groove shall be filled by re-welding by hand. The eads shall be built up in this manner to coincide with the normal beads formed by the elding machine. In case solid metal is not encountered in the chipping, the seam shall e reinforced with a butt strap on the outside of the pipe having the dimensions required y the engineer.

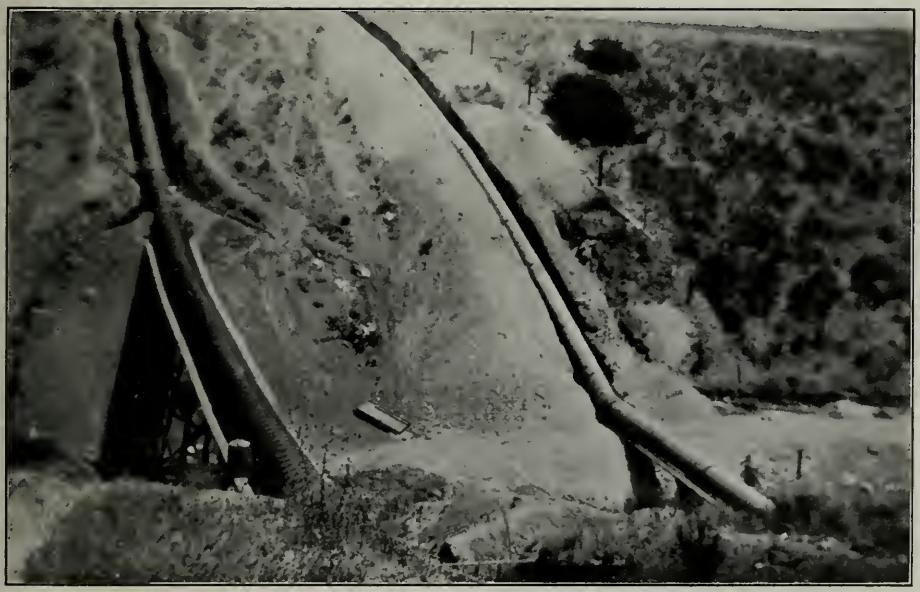
Shop Test. After each section of the pipe has been made, it shall be subjected to hydrostatic test in the shop under internal pressure sufficient to develop a tensile stress f 17,000 pounds per square inch of plate, and while under this stress shall be hammered igorously on both sides of the seam with a ten-pound hammer, not less than once in very foot of pipe section. The pressure shall then be increased sufficiently to provide or close inspection of the seams. As soon as such inspection determines the efficiency of ıe seams, the pipe shall again be brought back to the tensile stress of 17,000 pounds er square inch. In the event of the failure of a pipe section under this test, the contrac-or may repair it by chipping and rewelding the defective parts of the seams and re-ıbmit it for test, if, in the opinion of the engineer, it will produce a section suitable or use. No welded section of pipe shall be submitted by the contractor for the test rovided in this paragraph, that has required over 2½ per cent of the longitudinal welds) be repaired by hand, unless the repairs have been made under the direction or written ıstructions of the engineer. In determining the suitability of welded seams, the engineer ıall hammer the pipe section with a light machine hammer on and near each side of each elded seam for the purpose of determining its brittleness. Closing leaks by means of a aulking tool will not be permitted.

View showing trench, bell holes and pipe in trench on steep hillside. It will be noted that the bell holes are quite shallow.

Leakage Test. A hydraulic test with internal pressure equal to that produced by 150 per cent of the maximum static head in the section being tested, in lengths not exceeding three miles as designated by the engineer, shall be given the pipe throughout its length, and all visible leaks disclosed hereby shall be made tight. The hydraulic test herein provided for shall be applied to all pipe after it has been placed in the trench, and partially backfilled and all air and blowoff valves have been installed, but before it is backfilled at the circular joints. The contractor shall furnish, at his own expense, all of the necessary equipment and labor for making such tests, shall provide adequate bulkheads for sustaining longitudinal water pressure and shall be responsible for any damage resulting from the tests.

Cleaning. After the pipe has been tested it shall be thoroughly cleaned in such manner that immediately before being immersed in the dipping tank it shall be entirly free from all loose mill scale, rust, paint, grease, or other foreign matters.

Dipping. The pipe shall be dipped in a dipping tank in pipe coating, which shall be maintained at the temperature that will produce the best results in the opinion of the engineer. While in the dipping tank the pipe shall be manipulated or redipped in accordance with the directions of the engineer, so as to give a sound and perfect coating. The pipe shall receive a uniform coating about 1/32 of an inch in thickness. As the coating in the dipping tank is used in the process of dipping pipe, it shall be replenished from a preheating tank which shall be kept at a temperature of not over 400 degrees Fahrenheit. The dipping tank shall be cleaned out at intervals to maintain the quality of the dip. The appliances and methods of heating and applying the coating shall be subject to the approval of the engineer. In case the coating on any pipe be found to be of insufficient thickness the pipe shall be again immersed in the dipping tank and shall remain in the tank until the pipe has attained the temperature of the bath. It shall then be coated with the dip, in a satisfactory manner. In case the defect is from brittleness or scaling, or improper composition, or application of the coating, the coating shall be entirely removed and a new coating applied.



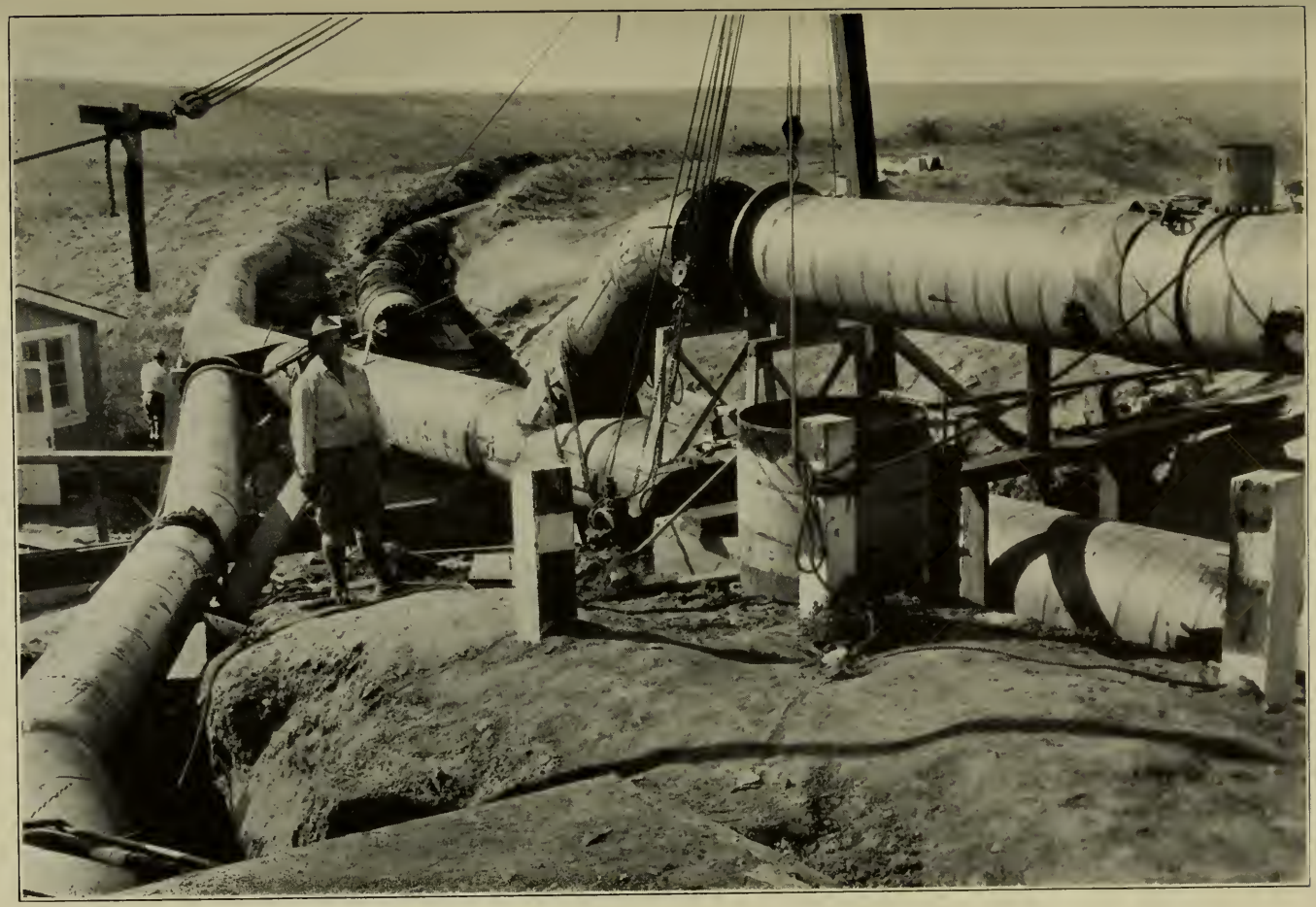
Another view of the San Diego pipe line showing the roughness of the country and method of trenching on steep hillsides.

Composition of Coating. The coating shall be pure California Asphalt and shall be composed of selected petroleum asphalt. The materials shall be especially selected for their suitability for pipe coating. The petroleum asphalt shall have a high melting point and shall contain a sufficient quantity of heavy bituminous oil to give it durability and ductility. If necessary, de-hydrated tar shall be added during the refining process to obtain these results.

Wrapping. After the pipe has been dipped and treated with the specified coating, it shall be spirally wrapped by machine, the covering to be put on under a tension of not less than 33 pounds per foot of width. During the wrapping a stream of hot liquid pure California Asphalt shall be applied to the covering in sufficient quantity to completely bond the covering to the pipe coating. The wrapping shall extend to within about five inches of each end of each section of pipe. Pipe in tunnels shall be dipped but not wrapped.

Composition of Wrapping. The base of the covering shall consist of a rag felt made of selected mixed cotton and woolen rags and burlap, pulped and moulded into a sheet of clean fabric or felt. The felt shall weigh not less than 9.5 pounds per 100 square feet before saturation. The felt shall be thoroughly saturated with a high melting point bituminous solution and shall not vary in weight more than two pounds either way from 21 pounds per 100 square feet. An asphalt coating, containing not less than 25 per cent by weight of an alkali resisting mineral, shall then be applied to both sides of the saturated felt. The combined weight of these coatings shall not vary more than two pounds either way from 19 pounds per 100 square feet. The total weight of the finished covering shall not vary more than two pounds either way from 40 pounds per 100 square feet. While the surface coating is still in a plastic condition, flaked mica shall be applied to one side in such quantities as to give the best results. The tensile strength of the covering shall be not less than 55 pounds per linear inch of cross-section.

Profile of the Otay Reservoir—San Diego pipe line contained a most unusual number of horizontal angles, vertical angles and curves. Short sections were welded together in the field to suit conditions.



Making final connections at Lower Otay filter plant, City of San Diego's new steel pipe line. The line extends from this point to University Heights reservoir in the northern part of the city.

Unquestioned Responsibility in Shop and Field

Designers, Fabricators and Erectors of

STEEL PRODUCTS

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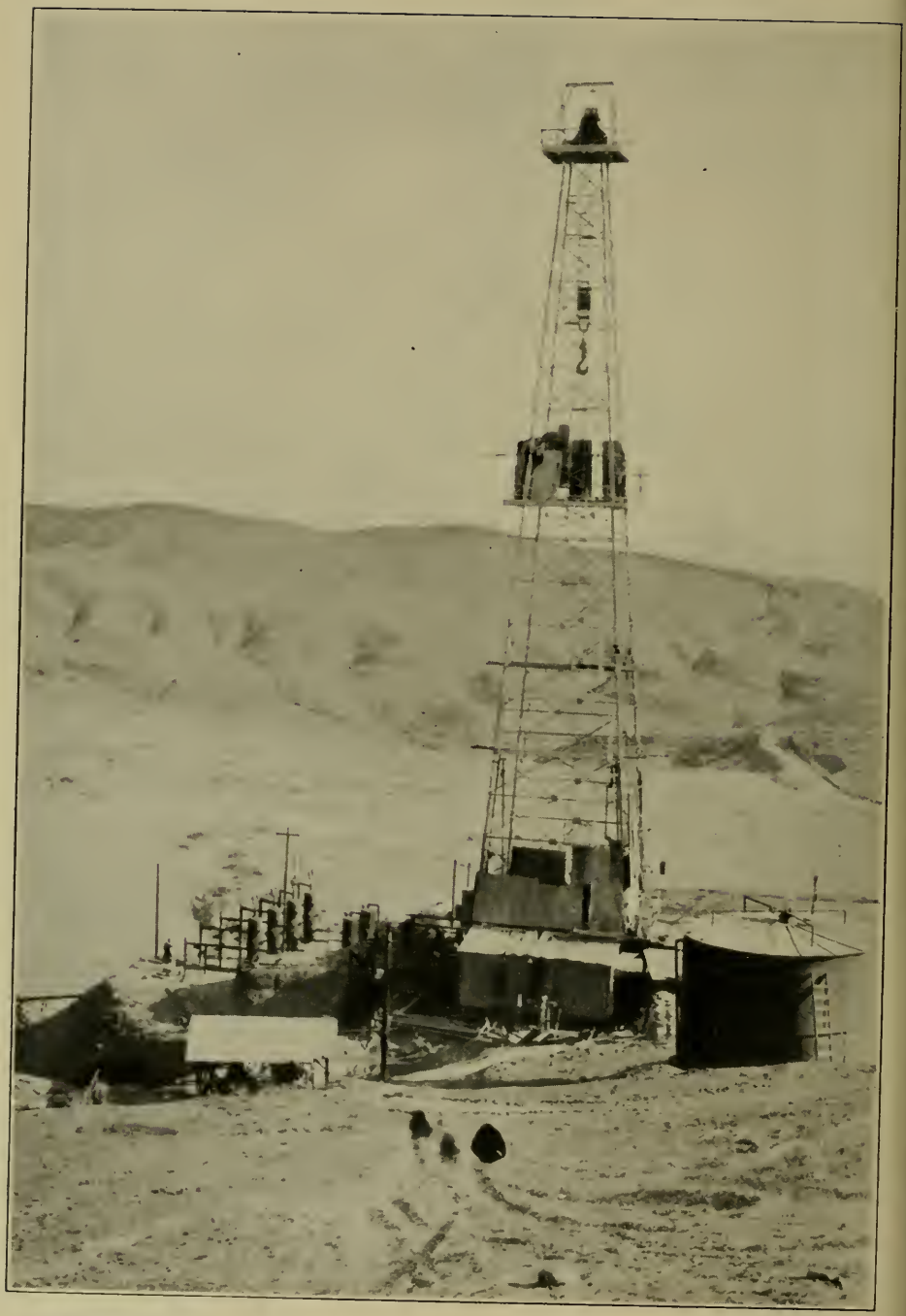
In This Issue:

Articles on Trumble Gas Traps and National Seamless Surface Casing

WESTERN PIPE AND STEEL NEWS



TRUMBLE GAS TRAPS ARE WIDELY USED IN KETTLEMAN HILLS—*At the left of the oil derrick may be seen a battery of Trumble separators built by Western Pipe & Steel Co., which now has exclusive manufacturing and sales agency for the entire Trumble line.*

Western Pipe and Steel News

PUBLISHED BY

WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA

SAN FRANCISCO · LOS ANGELES · FRESNO · TAFT · PHOENIX

Volume VIII | 1st and 2nd Quarters, 1931 | Number 1

Trumble Gas Trap Co. Appoints W. P. & S. Co. Exclusive Manufacturing and Sales Agent for U. S. and Foreign Countries

TRUMBLE GAS TRAP COMPANY on May 1, 1931, appointed Western Pipe and Steel Company of California, exclusive manufacturing and sales agents for the Trumble line of separators, scrubbers and allied products.

Trumble Gas Trap Company has been in existence in its present form since 1914, and heretofore has marketed its own products. Western Pipe and Steel Company, however, has manufactured for the Trumble people practically all of the separators, or traps, which they have sold to date, totaling more than 4,000 in number.

Western Pipe and Steel Company plans to intensify their efforts in the research and development of gas and oil separators to the end that the Trumble Gas Trap will continue to maintain its position of leadership in its field. It is hoped and expected that the consumer will greatly benefit by the coordination of manufacturing, sales and service effort, as the result of this arrangement.

The oil industry at large is familiar with the first attempts at separation, when a joint of casing was used as a separator to trap enough gas to use as fuel in the bunk house or cook house on the lease, and following this, the early days of the small Trumble separator, which replaced the joint of casing and gave the oil industry a separator with an automatic float-operated oil control. These early separators, although crude in comparison with the separators of today, served their purpose admirably, and hundreds of them were put into service on wells of varying size, and millions of cubic feet of gas were saved as fuel.

The advent of the absorption plant increased the importance of gas, and efforts were directed to the recovery of gas from all wells, so that the gasoline might be extracted, even though the excess gas was afterwards blown to the atmosphere. This brought about the development of new models for varying conditions, to meet the requirements of development at Santa Fe Springs, Huntington Beach and Signal Hill, where large volumes of oil and gas were handled at pressures varying from 50 pounds per square inch up to 200 pounds.

Alamitos Heights was the forerunner of real high-pressure separation, and the first 500 pound separator was used in that field. No separator for such pressure had been used before, and none had been built, and a delivery of six days was promised on the first one ordered, with the result that 30 minutes before the expiration of the sixth day, Western Pipe and Steel Company had the separator loaded on the truck ready for the field. The gas from this 500 pound separator was used directly for gas lift on other wells, several

A large stock of Trumble gas traps, including all models, is carried at Western Pipe & Steel Co.'s Los Angeles plant to meet the domestic and foreign needs of the oil industry.

of which were produced by injecting gas directly into them from the 500 pound separator without the aid of a compressor plant. Following the success at Alamitos Heights, high pressure separation was introduced into Ventura Avenue, and the first 700 pound separator was built by Western Pipe and Steel Company, for the Trumble Company, to go into that field, where it is still in use.

Double trapping was first used extensively in the revival of Santa Fe Springs, when the deep drilling uncovered the O'Connell and Nordstrom zones. A primary separator operating at from 275 pounds to 350 pounds, separated the oil and gas as it came from the well, and the oil from the primary separator was sent to the secondary separator, operating at approximately atmospheric pressure. Under the primary separation at the higher pressure, a certain amount of gas was dissolved in the oil and this gas liberated under atmospheric pressure was recovered at the secondary trap. In some cases, the primary separator was called upon to handle 4,000 to 8,000 barrels of oil with volumes of gas ranging from 10 million cubic feet to 35 million cubic feet. The secondary separator received all the oil from the primary, and with it, from 500,000 cubic feet to 2½ million cubic feet of gas that had been dissolved in the oil under the primary separating pressure. For this use, the Model C (275 pound working pressure) and later, the Model W (350 pound working pressure) was used on the first stage, and the Model E or R, for 100 pound maximum working pressure was used on the second stage.

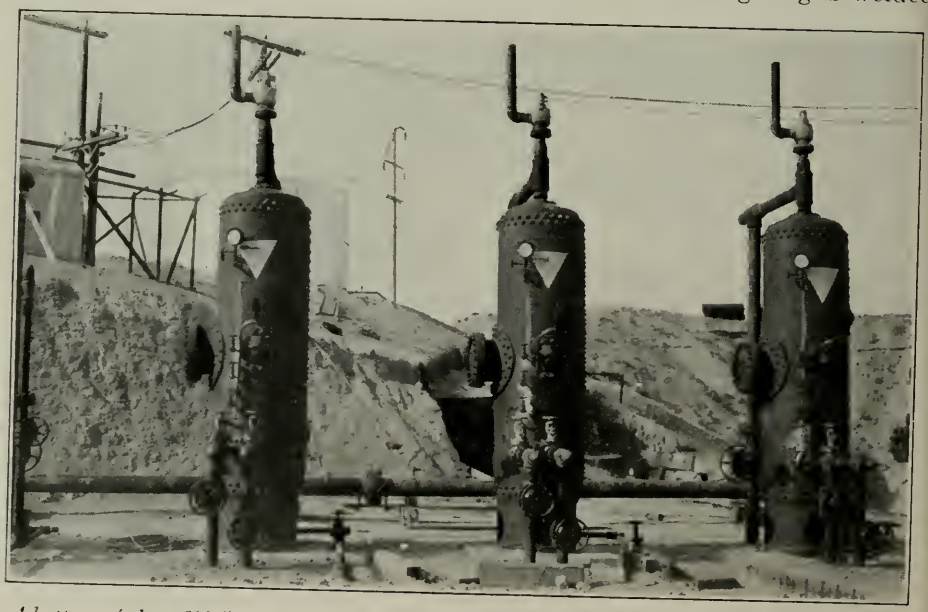
When the Elliot No. 1 well at Kettleman Hills was placed under control, it presented what appeared to many oil men to be somewhat of a problem. Some were skeptical of its solution with an ordinary separator. A representative of the Trumble Company made a trip to the well and immediately expressed his confidence in the ability of his product to effect the separation. Two 500 pound Trumble separators were available, and work was immediately started by Western Pipe and Steel Company on two more, and at the end of 14 days, four 500 pound Trumble separators were at the famous well, which has made history for the California oil industry. Before turning the well into the separators, the flow from the lead lines looked like steam flowing from a boiler, and when the separators were put into service, the issuing stream of gas was free from oil and carried only a comparatively low gasoline content, thereby effecting almost perfect separation of approximately 90 million cubic feet of gas from 4,000 barrels of oil. After 2½ years of service, these separators are still in use at the original location.

The separation of oil and gas has produced many problems. Ratios of oil and gas, nature of oil, volume of gas, sand content, water content, methods of operation in different parts of the world—all have produced problems that had to be considered with a view of incorporating features that would govern all conditions, as far as possible, in one type of appar-

atus. Where possible, tests and experiments have been carried out, with the aid of oil companies and in addition, exhaustion tests and experimental work has been performed with glass model separators, which has added much to the store of knowledge concerning separation.

This continued exhaustive research has brought about the new Kettleman Type separator, which is an elaboration of the original Trumble principle for separation of oil and gas. The first Trumble separators employed the principle of spreading the oil in a thin body on the interior wall, and complete and exhaustive tests have established this as the most efficient means of separation. In 1926 the method of introducing the oil into the separator to take fullest advantage of the spreading action, and also enlarge the separating space, was incorporated into the equipment, and now the addition of the Kettleman Baffle has served to improve the product still further, and employ the spreading means of the original Trumble patent to a point where it approaches perfection in the separation of oil and gas.

It will at once be apparent even to the uninitiated, that the gas will be much more readily liberated from a thin oil film than it will from an oil body of considerable depth. But even with a thin film, if the volume of oil and gas is large, considerable force may be imparted to the incoming stream, with the result that some gas may still be entrained with the oil when it reaches the oil body in the bottom of the separator. The velocity might be sufficient to carry to the bottom of the separator, and to prevent this, a deflecting ring is welded



A battery of three 500# Trumble oil and gas separators, commonly known as gas traps, installed at a well in the Kettleman Hills district

to the inside surface of the shell, just below the liquid level, and deflects the downward oil stream in a horizontal plane, across the top of the oil body. As a result the newly entering oil which may carry entrained gas bubbles, is kept at the top of the oil body, where the gas can readily leave it, and the outgoing oil is drawn from a lower strata that is free from entrained gas.

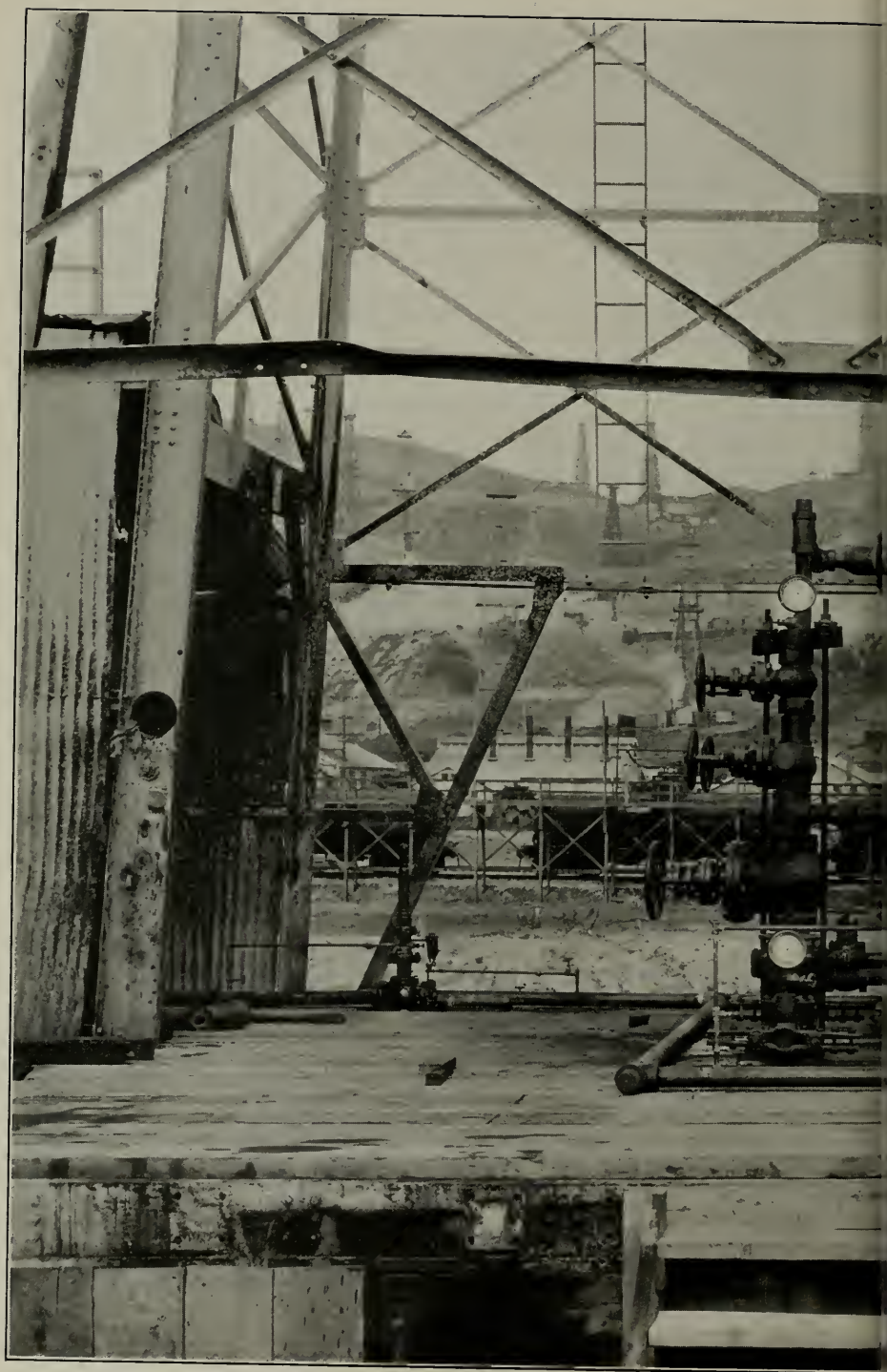
All low pressure separators are fitted with the double control unit which automatically controls both the outflow of oil and gas. This unit in operation opens the oil outlet when the liquid level reaches the minimum required during normal operation. However, if the oil does not flow from the separator at a rate equal to the incoming oil, the liquid level raises still further and this acting upon the float operates the double control unit, to restrict the gas outlet, thereby increasing the pressure in the separator to a point which will force the oil out at a rate to balance the inlet flow, and maintain a steady level.

Separators to operate at pressures ranging from 700 pounds per square inch down to and including vacuum operation, require careful design and construction and the best engineering practice is employed in their detailed construction. In addition, the construction from the point of view of economy, ease of repair, economy in installation, etc., is carefully considered. This will be apparent in noting the location of the manhole, which allows change of float without the hazardous necessity of a man entering the separator. Another point is the double oil outlet for high pressure separators, allowing an oil outlet valve to be changed or repaired without taking the separator out of service.

The importance of safety in separator construction is at once apparent to any one familiar with the tremendous volumes of gas that may issue from a well with high rock pressure, and equipment used has been given increased attention as it has come more and more under the influence of engineering departments, standardization departments, etc. The Trumble separators have, for the past few years, been built with a factor of safety of five, with careful attention given to detailed construction. The models R, Q, K, Y, X, W, I and H are built in conformity with the American Society of Mechanical Engineers' code for unfired pressure vessels.

Two general divisions of separators are made. Low pressure models, operating up to 100 pounds, 115 pounds, and 150 pounds, and high pressure models, operating up to 350 pounds, 500 pounds and 700 pounds.

Scrubbers for all ranges of pressure and vacuum, and for volumes from a small amount to many millions of feet are built, to meet the requirements of users on field gathering systems, absorption plants, etc., and employ the same general principle for separation as that used in the separators.



WESTERN PIPE & STEEL CO. OF CALIFORNIA NOW HAS EXCLUSIVE MANUFACTUR
AND SALES AGENCY FOR TRUMBLE SEPARATORS.—*For nearly twenty years Trumble oil*
gas separators, scrubbers and allied products have maintained

dership in the oil industry W. P. & S. Co., which has built over 4,000 units of this essential apparatus, s now taken over the marketing as well as manufacturing. The picture above shows the first 700# essure Trumble separator ever built. It is on an oil well at Ventura.

Western Pipe and Steel News

PUBLISHED QUARTERLY BY

WESTERN PIPE & STEEL CO. OF CALIFORNIA

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles

Edited by Richard Prosser

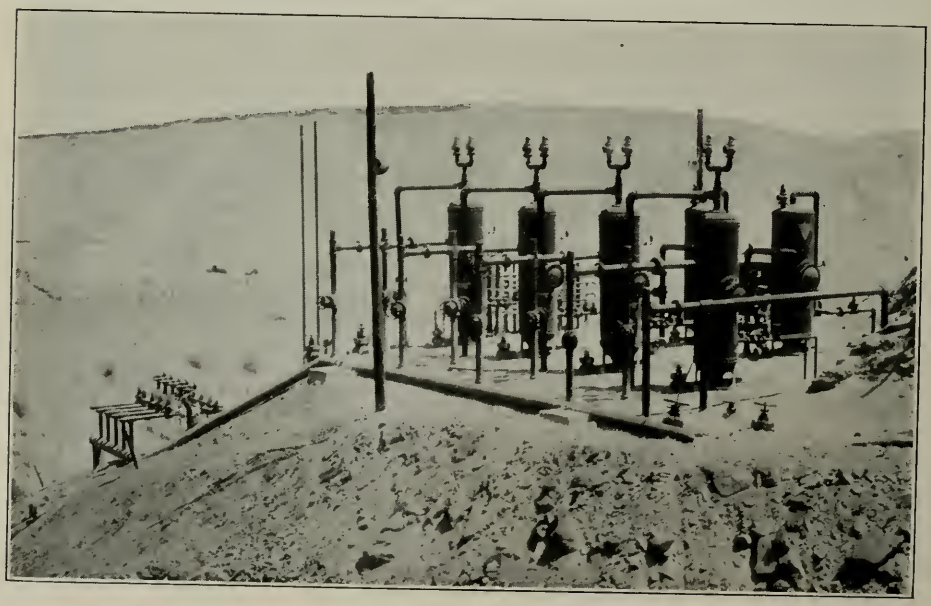
TWO IMPORTANT deals that will effect materially the future of Western Pipe & Steel Co., especially as to sales volume, are described at some length in this issue of *Western Pipe & Steel News*. The Trumble Gas Trap Co., since 1914 leaders in marketing a highly patented line of oil and gas separators, scrubbers and allied products, has appointed Western Pipe exclusive agent for manufacturing and sales for the United States and also for all foreign countries. With Western Pipe & Steel Co.'s manufacturing and sales organization, this proven gas and oil separator is expected to develop into an important factor in sales.

Arrangements have also been concluded whereby Western Pipe now sells and installs National Tube Co.'s product, known as seamless slip joint casing for oil wells. These new lines further widen the already great diversification of the company's products.

Western Pipe recently installed several strings of National Tube Co.'s seamless steel casing in California oil fields. The company has already established service crews and equipment in the major fields and stocks are maintained at Wilmington. It is planned later to carry stocks at Kettleman Hills and other districts.

THE COVER PICTURE

The Trumble oil and gas separators, or traps, shown on the front cover, are Model W and Model R, connected in series, and used in double trapping on an oil well located in the famous Santa Fe Springs field. Western Pipe & Steel fabricated this equipment at its Los Angeles plant.



The illustration above shows a battery of six Trumble oil and gas separators in the Kettleman-Hills oil fields.

W. P. & S. Co. Now Sells and Installs National Tube Co.'s Seamless Slip Joint Oil Well Casing

ARRANGEMENTS have been completed by which Western Pipe & Steel Company of California is now in a position to sell and install National Seamless Slip Joint Casing as manufactured by the National Tube Company, in all of the California oil fields. The company has already established service crews, together with equipment in the several major oil fields of California, to handle the installation of this new type of casing. Stocks at the present time are maintained at Wilmington, and it is contemplated in the near future to maintain a stock in the Kettleman Hills district and probably at other points.

To those who have followed the development of oil production in the State of California, the recent installation of 20-inch outside diameter 104 pounds per foot seamless slip joint casing in the Ferguson No. 3 well of the General Petroleum Corp. at Sea Cliff, marks one of the most epoch making steps in a constant series of advances in this important industry. A string of this seamless material was welded at the well by the field crew of Western Pipe & Steel Co. of California, and successfully set.

The importance of this achievement is the more impressive when it is realized that this 80,000 pounds per square inch minimum tensile strength steel casing is the first large sized seamless slip-joint casing to be manufactured in the United States, the largest size available prior to the development of the rotary rolling process of seamless manufacture being 13⅜ inch outside diameter. It is a tribute to California oil production engineering that this State should lead in the adoption and use of this material. In further evidence of the engineering achievements of oil drilling in this State it is to be noted that unlike most oil wells drilled in this country, the Ferguson No. 3 well is located on a pier extending 1000 feet into the ocean. The natural hazards and obstacles of drilling under such conditions are greatly increased over the usual drilling operations carried on from the ground. Western Pipe & Steel Co. is proud to be identified with such an important and timely development.

National Tube Co., subsidiary of the United States Steel Corporation with plants in the Pittsburg and Chicago steel districts, is to be credited with the development of American manufacture to the point where such large sizes of rotary rolled seamless casing are being manufactured and shipped. The uniformity in wall thickness in size and in weight of this material, its great strength and reliability, and its availability for shipment from Pacific Coast stocks mean that the impressive setting of this American-made material in General Petroleum's Ferguson No. 3 will be followed by many more similar installations in other wells where the finest of material and workmanship are demanded.

More recently Western Pipe & Steel Co. received an order from the Union Oil Co. for a quantity of National Seamless Slip Joint Casing. On May 27th 1218 feet of 18⅝ in. 84.5

Picture at left shows elevator and slips supporting joint of 18⅝" National seamless surface casing, being lowered in Union Oil Co.'s Bell No. 62 well at Santa Fe Springs. At right Western Pipe's welding crew welding a round seam on the same installation.

pound casing was set in their well Bell No. 62, in the Santa Fe Springs field.

Later still, the welding crews of Western Pipe & Steel Co., set 1037 ft. of 18⅝ in. 84.5 pound high tensile slip joint casing in Superior Oil Co.'s Huffman No. 3 at Kettleman Hills. This was the first string of American made large size slip joint seamless casing to be set in Kettleman Hills and has added another feature of safety and surety against the high oil and gas pressures being encountered in this outstanding field.

For the information of those interested, we publish the following technical data regarding National Seamless Slip Joint Casing:

1. The Casing is manufactured from Seamless Steel 80,000 pounds per sq. in. minimum tensile strength.

2. The principal chemical properties are:

Carbon	.37 to .44
Manganese	.84 to 1.00

3. The fit of the Insert Slip Joint is manufactured to meet a total maximum clearance allowance of ⅛ in. or $\frac{1}{16}$ in. on a side.

4. At present the length of Joints will average 35 feet on all sizes.

On stock replacements this will be increased to an average of between 35 and 45 feet.

5. Each piece of Casing is hydrostatically tested at the mill as follows:

18⅝" O.D. 84½#—900 lbs. per sq. in.
16" O.D.63½#—900 lbs. per sq. in.
20" O.D. 104#—950 lbs. per sq. in.

6. The approximate bursting pressures calculated in accordance with Barlow's Formula are as follows:

16" O.D.—3750 lbs. per sq. in.
18⅝" O.D.—3735 lbs. per sq. in.
20" O.D.—4000 lbs. per sq. in.

7. The setting depth for Collapse with a safety factor of two, is as follows:

16"	O.D.	890 ft.
18⅝"	O.D.	880 ft.
20"	O.D.	1076 ft.

The above figures are based on the casing being bailed dry and surrounded on the outside by a column of salt water.

8. Due to the fact that this material is welded in the field, the Mill is not in a position to give figures on the length of string equivalent to the tensile strength of the joint. However, we believe it is generally assumed that a welded joint is at least equally as strong as a threaded and coupled joint and it might be of value to know that on threaded and coupled material of the same size and weight the tension figures with a factor of safety of 2½ are as follows:

16"	O.D.	5753 ft.
18⅝"	O.D.	6066 ft.
20"	O.D.	6300 ft.

9. The outside diameter of the bell of the Slip Joint is as follows:

16"	O.D.	16.875 in.
18⅝"	O.D.	19.620 in.
20"	O.D.	21.125 in.

10. The inside diameter of the material is as follows:

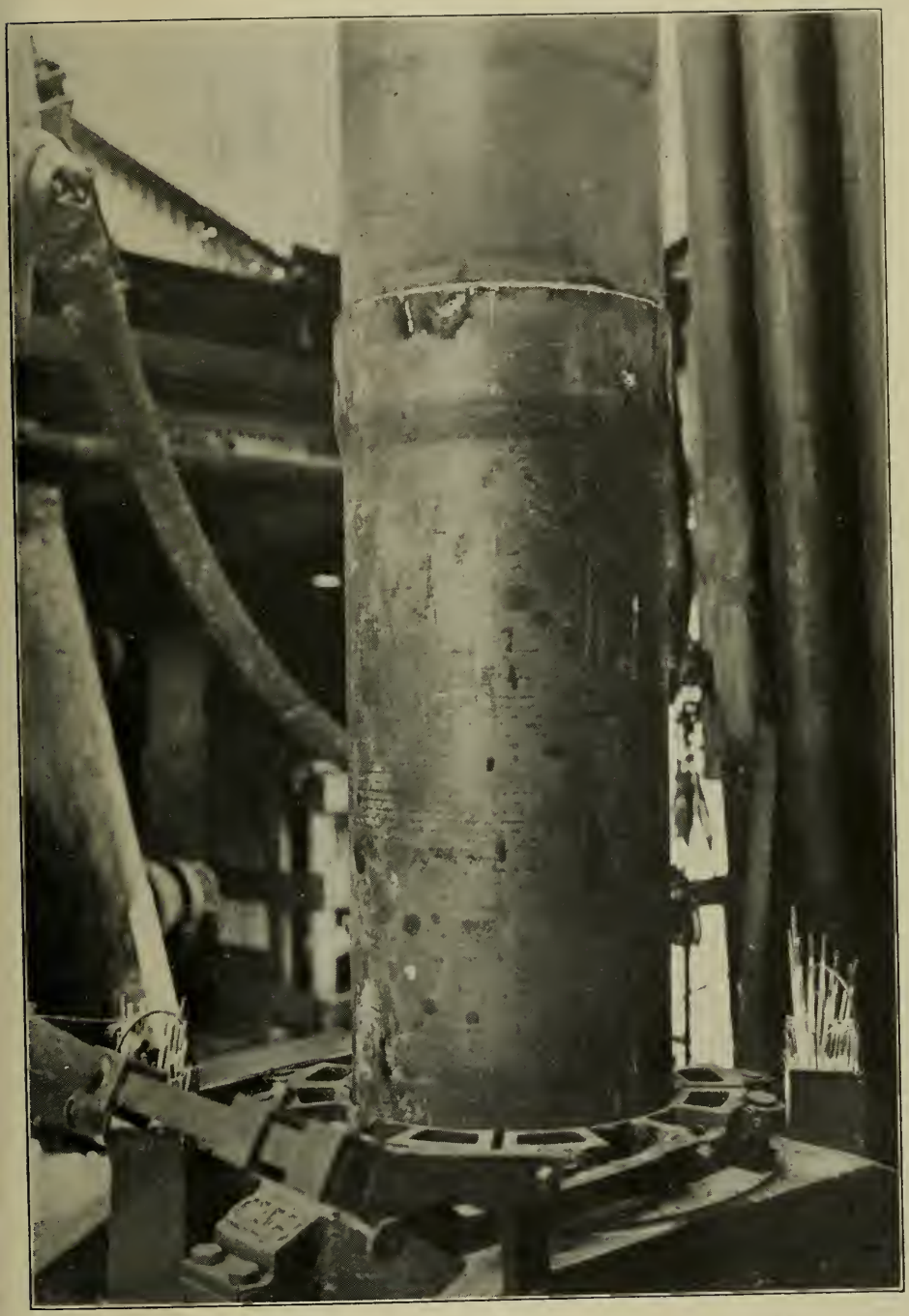
16"	O.D.	15.25 in.
18⅝"	O.D.	17.755 in.
20"	O.D.	19.00 in.

11. The length of the Insert on the Slip Joint is as follows:

16"	O.D.	5.5 in.
18⅝"	O.D.	6.0 in.
20"	O.D.	6.375 in.

12. On the bell of each joint of Slip Joint Casing there are six one-inch holes staggered on the circumference. These are for spot welding.

W. P. & S. Co.'s welding crew welding round seam on a string of 20" diameter National seamless slip joint surface casing, General Petroleum Corp. Ferguson No. 3, near Ventura. The well is located on a pier extending 1000 feet over the ocean.



WESTERN PIPE & STEEL NOW SELLS AND INSTALLS NATIONAL SEAMLESS SURFACE CASING.—*The above view shows installation of* 1218 *ft. string of* 18⅝" *seamless steel casing at Union Oil Co.'s Bell No.* 62, *Santa Fe Springs field. The picture shows completed weld.*

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SPECIAL COLLECTIONS

In This Issue:

The San Joaquin Division of Hetch Hetchy

WESTERN PIPE AND STEEL NEWS

MAKING UP THE FIRST TRAINLOAD OF STEEL PIPE FOR HETCH HETCHY, SAN JOAQUIN DIVISION.—*This picture was taken*

Western Pipe and Steel News
PUBLISHED BY
WESTERN PIPE AND STEEL COMPANY OF CALIFORNIA
SAN FRANCISCO , LOS ANGELES , FRESNO , TAFT , PHOENIX

Volume VIII Third Quarter, 1931 Number 2

The San Joaquin Division of Hetch Hetchy

By M. M. O'SHAUGHNESSY,
Chief Engineer, City and County of San Francisco.

THE City of San Francisco, in approaching completion of its gigantic Hetch Hetchy Water Supply System, has let a contract for construction of a 47½ mi. steel pipe line across San Joaquin Valley, the garden spot of California. The contract was let in May, 1931, to Youdall Construction Company, general contractors, and the pipe fabrication and laying are being done by Western Pipe and Steel Company, this being one of many jobs for this system that this company has done.

The Hetch Hetchy system is being built to take from the high levels of the Sierra Nevada 400,000,000 gallons of water daily and by using appropriate drops in the aqueduct on its way to San Francisco, to develop 250,000 h.p. of hydro-electric energy. The system is of careful and conservative design and in its construction the city is using every effort to build substantially for the future.

M. M. O'SHAUGHNESSY

Water from the melting snows and glaciers of the upper portions of the Tuolumne river watershed is stored in two main reservoirs, Hetch Hetchy, occupying what was a valley on the main Tuolumne river, and Lake Eleanor, an ancient lake on one of the tributaries of this river. The plans contemplate diversion of water from Cherry Creek, another tributary, into Lake Eleanor.

Nowhere do we know of any system that will produce water of greater purity than is obtained here. The total dissolved solids amount to less than 15 parts per million, and the hardness is but 2½. The reasons for this are the facts that the watershed area is entirely in granitic formation, that almost the entire area is within Yosemite National Park, where the land is owned by the United States Government or the City of San Francisco, and is at such great elevation that it is uninhabitable for the greater part of the year. It is difficult to imagine any contamination of this ideal water and the city has no intention of purifying it by sedimentation, filtration, chlorination, or any other artificial means.

The main impounding reservoir, known as Hetch Hetchy, elevation 3726′,

from the name of the valley now occupied by the reservoir, was created in 1923 by construction of O'Shaughnessy Dam, the principal feature of the project. This dam is an arched gravity section containing 400,000 cu. yd. of concrete. Its height above lowest point of foundation is 344½ft., and the foundation has been built to support an addition of 85½ ft. to the present structure. The foundation was developed with the greatest care so as to make the dam absolutely safe. This structure has all the modern features for safety, such as contraction joints with copper water stops, drainage wells, inspection wells, inspection galleries, etc. It was built by contract by Utah Construction Company, which is one of the six companies now engaged in constructing the Hoover Dam on Colorado River. O'Shaughnessy Dam has converted Hetch Hetchy Valley into a lake 7½ mi. long holding as much water as San Francisco uses in more than three years.

The other storage reservoir, Lake Eleanor, 4661′ elevation, was made by building a buttressed arch dam 1260 ft. long and 70 ft. high. At some future date the capacity of this reservoir may be increased to nine times its present capacity by constructing a rock fill dam 225 ft. in height. Lake Eleanor will then receive an additional amount of water by diversion through a flood canal from Cherry Creek. The two main reservoirs, with the present state of development, produce sufficient water for the needs of about 2½ million people. The additional development will produce water sufficient for 4 million people.

When the steel plates come out of this roll they are in semi-circular form. Two of these are tack welded and then placed in automatic welding machines.

From the mountain reservoirs an aqueduct 167 mi. in length is being built to San Francisco. The general location follows closely along what is known as the "Freeman Plan", wherein John R. Freeman of Providence, R. I., associated with the New York Water Supply, redesigned the entire system along modern engineering lines making full use of pressure tunnels. In the original plans it had been the intention to use many miles of open unlined canal and to pump the water through pipe lines over Altamont summit in the Coast Range mountains, utilizing for this purpose power which would have been developed at two small plants in the Sierra foothills. The Freeman Plan uses a gravity aqueduct throughout and provides for development of hydro-electric energy for commercial sale. One of the major power houses planned has been in operation since 1925 and has produced a revenue approximating $14,500,000 since that date. The Freeman Plan has received several slight modifications by the City Engineer after conference with able consultants.

Leaving the impounding reservoirs the water follows stream channels, this course to be later supplanted by power tunnels and electric development. At Early Intake, 155 mi. from San Francisco and 12 mi. down Tuolumne River from O'Shaughnessy Dam, the water from Lake Eleanor meets the water from Hetch Hetchy. Here a concrete dam turns the combined waters into the Mountain Aqueduct Tunnel, which may be considered as the first unit of the aqueduct proper, the future development above

At the left is testing machine in which every section of pipe is subjected to hydrostatic pressure. At the right are pipe sections ready for the dip kettle.

Every section of pipe receives a coating of hot asphaltum. This view shows pipe section being lowered into dip kettle. At the left two sections cooling off.

this point being more properly for power purposes.

The tunnel, with a fall of 8 ft. per mile, has a capacity of 460 million gallons daily. For the first 7 mi. it was driven through solid granite mountains and for this distance it is a 13 ft. diameter horseshoe and is not lined with concrete. For the next 12 mi. it passes through slate, quartzite and schists in the form of a horseshoe 10 ft. 3 in. in diameter to finished line of concrete.

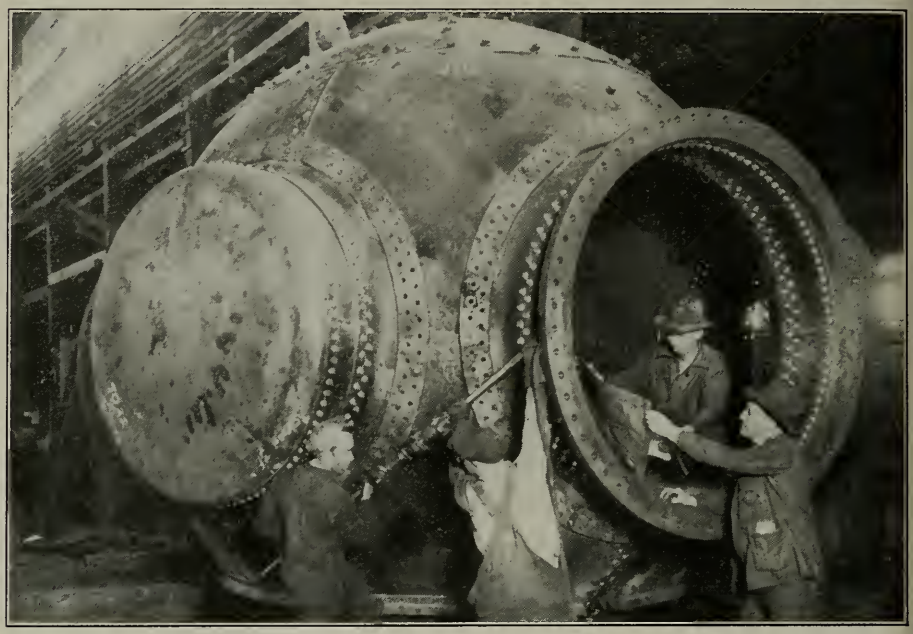
At the end of this tunnel is Priest Reregulating Reservoir, elevation 2,-245′, for operation of Moccasin Power Plant, holding more than 2 days' flow of the aqueduct, formed by construction of an earth and rock fill dam with articulated concrete core wall. From the reservoir the power tunnel, 1 mi. in length, 13 ft. in diameter and lined with concrete, leads westerly to Moccasin surge shaft, a concrete structure 40 ft. in diameter and 160 ft. in height. In the surge shaft 3 penstock pipe lines begin. These reduce from 13 ft. diameter to 8 ft. 8 in. diameter in the first few feet. Where they emerge from the tunnel one of the lines is capped for future extension. The other two continue down the mountain side, reducing in diameter and branching twice into eight 30-in. pipes which are 1⅜ in. thick.

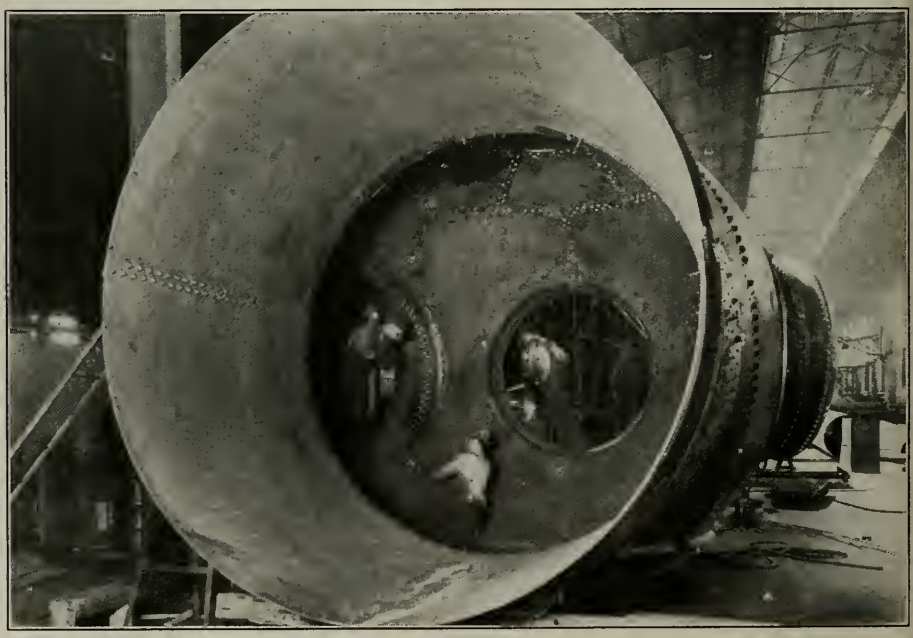
These pipes enter Moccasin Power House to discharge the water through 11 in. diameter nozzles, with a drop of 1316 ft. against impulse water wheels directly connected to four electric generators which produce over 100,000 h. p. of electric energy. This Moccasin Power House is ideal in construction. The building is of concrete with steel frame and tile roof. The adjacent village, which is owned by the City, consists of a number of concrete and tile cottages built by the City to house the power house employees. There are paved streets and green lawns, a clubhouse, a concrete schoolhouse, a post office, and many other features which constitute a beautiful modern settlement.

The water passes from the tail race of Moccasin Power House into a reregulating reservoir made by construction of Moccasin Dam, elevation 927′. This reservoir reregulates or evens up the constancy of flow of the water after its interruption by operation of the power house.

This dam, the sixth to be constructed on Hetch Hetchy project, is a rock and earth fill 830 ft. long and 75 ft. high containing a monolithic concrete core wall.

The Foothill Tunnel, with fall of 8 ft. per mil., begins at the main outlet tower of this reservoir and extends 15.8 mi. westerly to Oakdale Portal, the east edge of the San Joaquin Valley. It is interrupted at Mile 5, at a point called Red Mountain Bar, by crossing Don Pedro Reservoir on Tuolumne River. This crossing is made by means of a 9½ ft. diameter inverted steel siphon. The pipe is laid in a trench 12 ft. deep excavated out of the bedrock of the river canyon, for which purpose it was necessary to divert the river. The pipe was covered with an outer envelope of concrete from 18 in. to 24 in. thick and was lined internally with cement mortar. The present plan for bringing in Hetch Hetchy water by June, 1932, necessitates early construction of about 1300 ft. of 9½ ft. diameter extensions to both ends of the present pipe at this point as the entire crossing was not laid originally. At this point it is feasible to construct a power house of about 2500 h.p. capacity.





Two views of ball manifold for Hetch Hetchy San Joaquin pipe line. This manifold will be placed at the Oakdale Portal of the Foothill tunnel, and consists of a sphere 14′ diameter, 7/16″ plate, riveted construction throughout. The inlet to the manifold from the tunnel is 10′ 3″ diameter. Three outlets for pipe lines 6′ diameter are provided.

In undertaking construction of the Foothill Tunnel the City built camps, installed machinery, pipe lines and other auxiliaries and drove about 1,000 ft. of tunnel in each heading. By this means contractors were able to inform themselves exactly of the nature of the ground through which the tunnel was being driven. Bids were then called for. Upon analysis of these bids, contracts were let to two contractors for driving and lining parts of the tunnel, while the City elected to do the remainder of the work. The tunnel is of practically the same cross section as the mountain tunnels, that is 10 ft. 3 in. diameter to finished line of concrete and the City forces in one month drove 803 ft. of this tunnel.

From Oakdale Portal, the westerly end of this Foothill Tunnel, to Tesla Portal there is now under construction the San Joaquin pipe line. Originally it had been planned to defer construction of this pipe line until about the middle of 1932 so that it would be completed simultaneously with the Coast Range tunnels at the end of 1933, but fear of water shortage, should next winter be as dry as the last three winters have been, has indicated the advisability of completing this unit at an early date so that it may be used as a portion of an emergency line to bring Hetch Hetchy water into San Francisco in advance of the completion of the tunnels.

Contract for this pipe was let on May 22, 1931 by the Board of Public Works to Youdall Construction Company in the estimated amount of $4,136,479. It consists of 47½ miles of welded steel pipe from 56 to 66 in. diameter with plate thickness ranging from $\frac{5}{16}$ in. to ½ in. The total amount of steel approximates 40,000 tons. Time of completion is set for one year with provision for bonus for early completion, the maximum amount of bonus being $20,000. The contractor has furnished a bond of $500,000 for faithful performance of contract and a bond of like amount to insure payment for labor, materials, etc. For the first 8 miles from Oakdale Portal the pipe line descends through rocky country in which it is necessary to drill and blast for the trench. The right of way in this section is 200 ft. wide. At the intersection with the present power transmission lines of the Hetch Hetchy system the width of right of way decreases to 110 ft. The northerly edge of the right of way is occupied by the City's double circuit power transmission line (Moccasin to Newark) on galvanized steel towers. Eventually the right of way will be occupied by two power transmission lines and three pipe lines. The new pipe line is being laid on the southerly side of the right of way, generally 24 ft. in from the edge to allow for future construction.

Across the greater part of San Joaquin Valley the soil is a sandy loam. Studies were made of the chemical nature of the soil and of the ground water so that the protective coating on the pipe might be determined to give the longest life to the steel. As a result of these soil surveys several different types of pipe protection are being used. All pipe is dipped in an asphaltic coating which must have a final thickness of at least $\frac{1}{16}$ in. In the dry non-corrosive soil this will receive additional protection, being wrapped with 40 lb. asphalted felt. In slightly corrosive soils or in locations that although dry now may later, if placed under irrigation, develop corrosive properties the felt

(Continued on Page 11)

HETCH HETCHY PIPE LINE OPERATIONS JUST WEST OF THE SAN JOAQUIN RIVER.—*This view is looking west from the river crossing. The river itself is about fifty yards east of the trestl work. The concrete saddle*

in the bottom of the trench are placed on piles driven to a considerable depth on account of the soggy character of the soil. It is possible that in the future this part of the line may be submerged by the State Water Conservation Plan.

Western Pipe and Steel News

PUBLISHED QUARTERLY BY

WESTERN PIPE & STEEL CO. OF CALIFORNIA

444 Market Street, San Francisco
5717 Santa Fe Avenue, Los Angeles

Edited by Richard Prosser

FOR the fourth time in the history of San Francisco's great Hetch Hetchy water development, Western Pipe & Steel Co. of California has been called upon to participate in forwarding this monumental enterprise. We are not unmindful of the distinction of such participation. It is a great thing for any concern to be associated in a project that will stand for generations as a silent tribute to the engineering genius that conceived it.

In 1923-24 Western Pipe & Steel Co. fabricated and installed more than nineteen miles of steel pipe 60 inches in diameter, constituting the Bay Crossing Division of the Hetch Hetchy project. This line runs from Irvington, in Alameda County, to Pulgas tunnel at the southern extremity of Crystal Springs Lake in San Mateo county.

The second phase of Hetch Hetchy in which this company participated was the upper penstocks for the Moccasin Creek power house. These penstocks are 104 inches in diameter at the upper end and are among the largest ever fabricated.

The third of Western Pipe & Steel Co.'s major contracts in San Francisco's water supply project, was the thirteen-mile emergency line from San Lorenzo to Newark, tying the East Bay Municipal Utilities district into the Bay Crossing Division of Hetch Hetchy. *(Continued on Page 13)*

Unloading trainload of pipe at Vernalis wrapping plant. Note special steel saddles on flat car, to which pipe is bolted.

(Continued from Page 7)

rapping is displaced by a ½ in. oating of 12 sks. per yd. cement nortar with wire mesh insertion. In he soggy soil at and adjacent to the iver crossing, an area that in the uture may be submerged by the State Water Conservation plan, the con-rete envelope is made 6 in. in thick-ness. This pipe rests on concrete addles on pile trestles.

In the rocky trench near Oakdale Portal, in addition to bedding the pipe and backfilling the trench with ine material the asphaltic coating will be protected from mechanical in-jury by using the ½ in. exterior con-crete envelope.

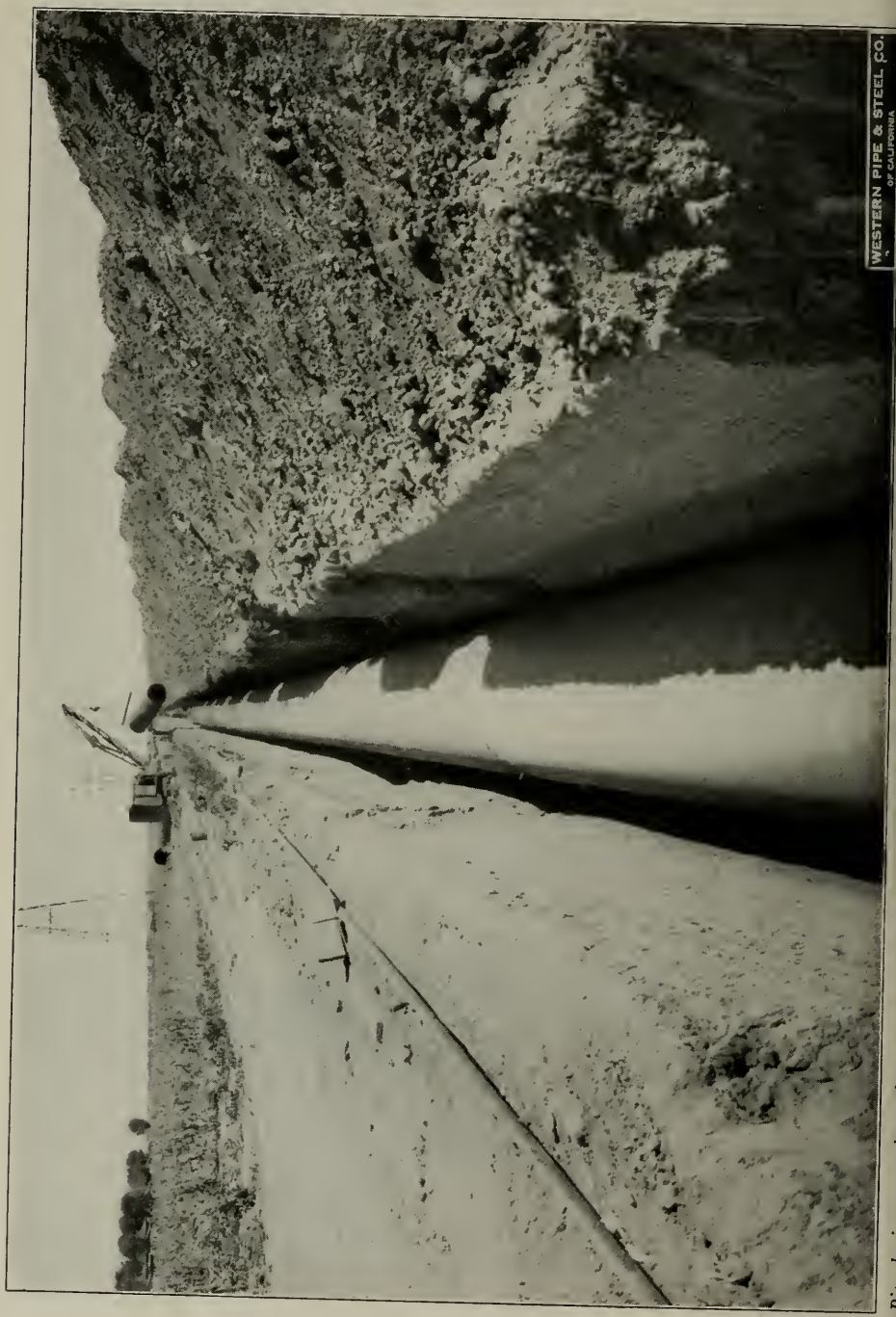
At San Joaquin River and Elliott Cut the pipe is depressed below stream bottom and rests on concrete saddles supported by timber piling. The external concrete jacket is here 6 in. thick and the pipe is lined inter-nally with cement plaster of minimum thickness of 1½ in.

From San Joaquin Valley westerly the Coast Range Tunnel is now under construction. This extends from Tesla Portal, elevation 399′, the westerly terminus of the San Joaquin pipe line, to Irvington Portal, elevation 316.4′, near Mission San Jose. The tunnel consists of a unit 25 mi. in length, the longest single tunnel ever under-taken by man, and a 3½ mi. unit separated by pipe line 6/10 of a mi. in length. The finished tunnel is 10 ft. 6 in. in diameter, of circular cross section with concrete walls 2 ft. in thickness. Its grade is about 2½ ft. per mi. The location of the tunnel was determined after careful geo-logical surveys, supplemented by dia-mond drill borings.

In the 25 mi. section the tunnel is reached by 5 shafts from the surface, 2 of these being over 800 ft. deep. The great depth of these shafts comes as a result of shifting the tunnel southerly in an effort to bring to a minimum the distance which must be tunneled through unfavorable geo-logical formations. At the present time over 21 mi. of the total 28.5 mi. have been excavated. About 4 mi. have been lined with concrete placed by the gunite methods. Concrete placed by the standard concrete gun method has been completed in about ½ mi. of tunnel and invert of similar character has been placed in about 1¼ mi. additional. The concrete gun operations are being carried on in the 4½ mi. section from Tesla Portal to Thomas shaft and preparations are complete for undertaking similar work in the 3½ mi. section from Irv-ington Portal westerly. These two units of tunnel are to be used in con-nection with an emergency pipe line which will be constructed within the next 8 months to bring Hetch Hetchy water to San Francisco in 1932, prior to completion of the tunnel construc-tion.

From the end of the Coast Range Tunnel the Bay crossing pipe line, 21 mi. in length, extends westerly through Newark via Dumbarton Strait and Redwood City to meet Pul-gas Tunnel, which discharges into Crystal Springs reservoir of the San Francisco Water Department. A short portion of this pipe line immediately adjacent to Irvington Portal has not yet been laid, but bids for its construc-tion will be called for very shortly. The remaining 19 mi. was laid by Western Pipe and Steel Company in 1923 and 1924. This pipe is 5 ft. diam-eter riveted steel with plate thickness varying from $\frac{5}{16}$ to $\frac{7}{16}$ in. In firm and dry ground the pipe is buried, except for those portions crossing ravines near Pulgas Tunnel where use is made of steel trestles on concrete piers. Over the marsh lands adjacent to Dumbarton Strait the pipe is elevated on a low timber trestle on piles and is protected from the weather by board covering.

The crossing of San Francisco Bay at Dumbarton Strait is particularly



Pipe laying operations along the Imperial Canal

teresting. The navigable channel, ›out ½ mi. in width, requires the ;e of submerged, flexible joint, cast on pipe which is laid in a trench ›edged in the bottom of the Bay, at ıe point 70 ft. below the water sur- ıce. The pipe is 42 in. in diameter ıd 2 in. thick. Having crossed the avigable channel the pipe enters a ›ncrete caisson in the middle of the ay. This caisson was one of the .ost difficult jobs on the entire sys- ›m. It is hexagonal in plan, taper- ıg upward from a base diameter of 1½ ft. to a short diameter at the top f 40 ft. Down the central portion a 4 ft. diameter hexagonal open well 'as constructed to accommodate ipes with provision for connection ›ith the present submarine pipe and future pipes. This concrete pier is ıpported on 715 piles driven into lay and gravel strata to an average epth of 100 ft. below water level. 'he circular coffer dam within which ıe structure was built, consists of 21 oncrete prisms approximately 8 ft. hick, with connecting webs. This aisson forms the first or easterly pier f a bridge 3870 ft. long, which ex- ends from here to the westerly shore f the Bay near Ravenswood Point. 'he bridge consists of 36 steel spans n concrete piers and is designed for wo pipes 6 ft. 4 in. in diameter.

Pulgas Tunnel, at the end of the 3ay crossing pipe line, similar in sec- ion to the Mountain Division Tunnel, s 10 ft. 3 in. in finished diameter and lined with concrete of minimum thickness of 6 in. The tunnel is 1¾ mi. in length and from its terminus, elevation 290′, a concrete outfall canal discharges into Crystal Springs reservoir in San Mateo County. Eventually Hetch Hetchy water will be discharged directly by gravity into Amazon reservoir in San Francisco at 250 ft. elevation.

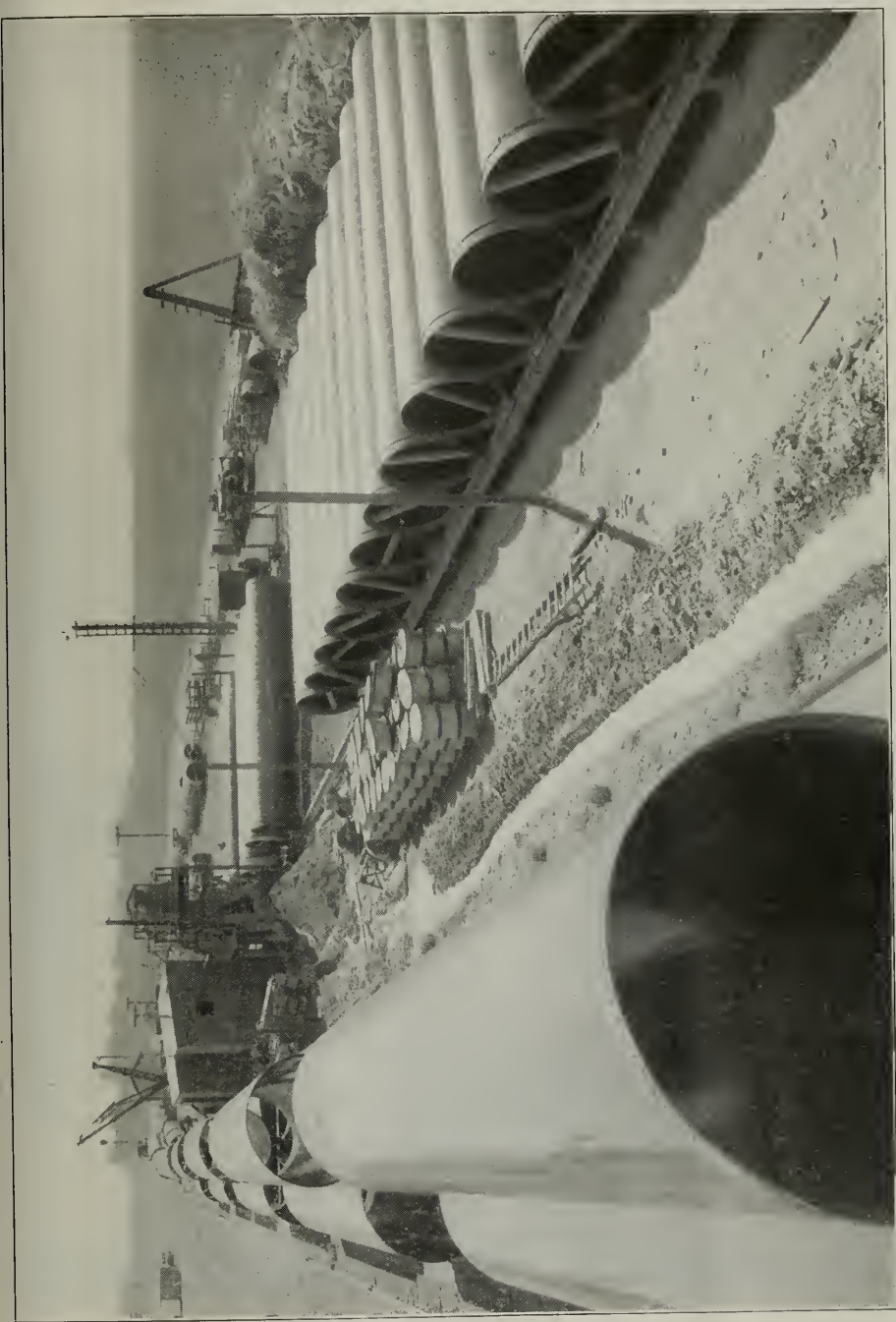
The Hetch Hetchy construction has been financed by four bond issues aggregating $79,600,000. To date somewhat over $70,000,000 has been spent in the construction. Due to the diversion of money from the construction fund for the emergency pipe lines and also due to the fact that an extraordinary investment was required to carry out various safety methods in tunnel construction, it will be necessary to replace about $4,000,000 in the aqueduct construction fund. Power revenue from the inception from power delivery to the present date totals about $14,500,000. This has been applied largely toward payment of interest on bonds and for retirement of bonds and has done much to reduce the amount of taxes borne by the citizens of San Francisco. For the fiscal years 1924-25 to 1930-31 the average amount paid in taxes for water purposes has been 18c on the $100 valuation which compares very favorably with the corresponding figure of 28c which has obtained in the East Bay Municipal Utility District.

(Continued from Page 10)

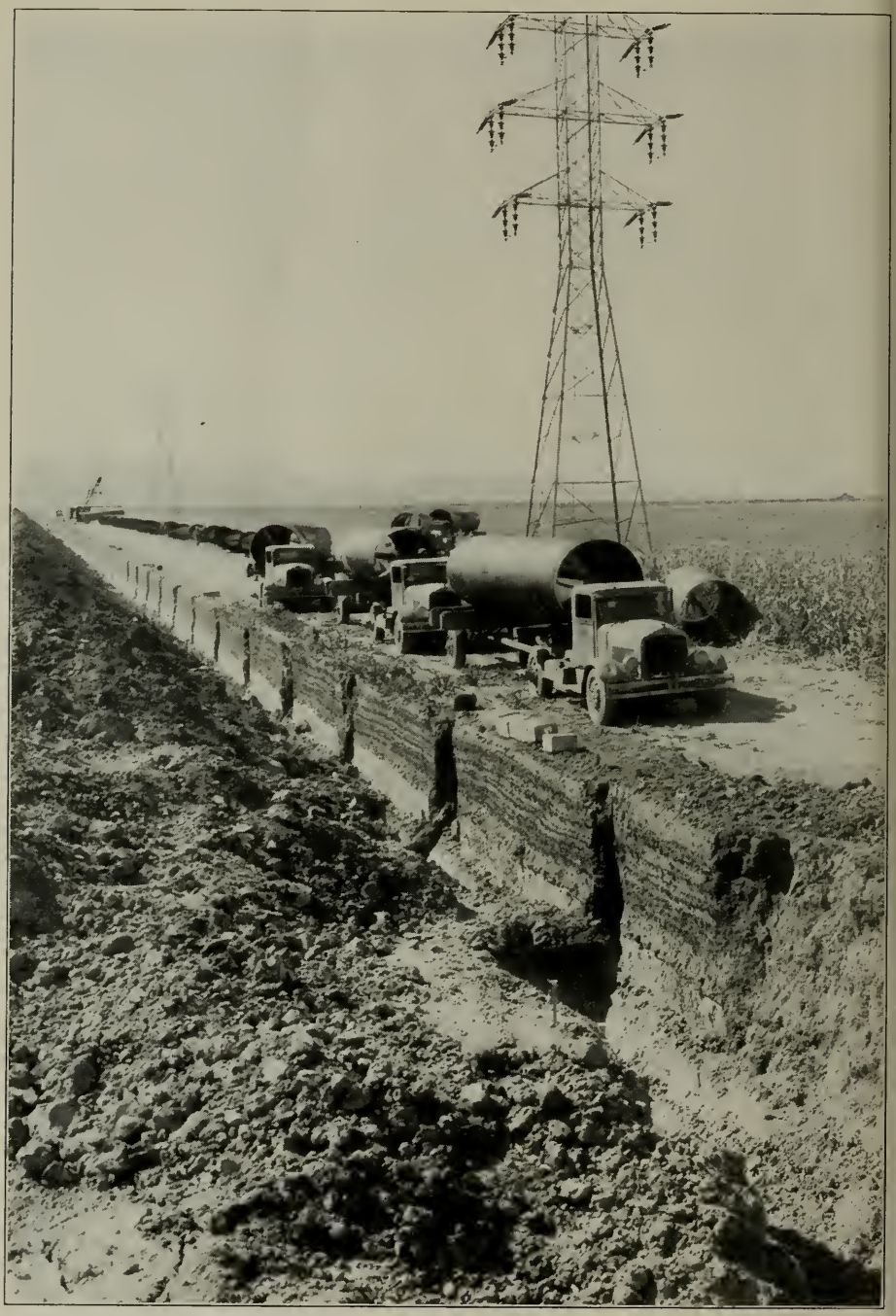
The present contract calls for 'orty-seven and one-half miles of au- ›omatic welded steel pipe across the San Joaquin Valley from Oakdale ›ortal in the Foothills division, to Tesla portal in the Coast Range tun- ıels. The line is scheduled for com- ›letion in June, 1932. Details of the ›roject are set forth in Mr. O'Shaughnessy's article in this issue, to which we call special attention.

The general contract for the San Joaquin Division of the Hetch Hetchy system was placed by the San Francisco Board of Public Works with the Youdall Construction Co., which has been identified with many outstanding construction projects on the Pacific Coast.

Pipe laying crew installing 30 ft. section of 62" diameter steel pipe. Note bellhole in foreground for field joint.



Special wrapping plant erected at Vernalis, fourteen miles southeast of Tracy and close to the line of trench. Pipe at right has been cement coated and is ready to be trucked to the trench.



DISTRIBUTING PIPE ALONG TRENCH, HETCH HETCHY SAN JOAQUIN DIVISION. —*Six powerful trucks have just arrived at the trench side, each carrying a 30 ft. section of 62" diameter steel pipe. This offers another excellent view of trench and bellhole excavation.*

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BECAUSE THIS IS AMERICA

FOURTEEN YEARS AGO our streets were full of marching men—grim, determined men—marching on to the roll of drums and America's bugled summons to sacrifice. The patriotism of every man, woman and child was put to the test. Men and women gave of their lives and treasure that those inner things we call "America" might be served.

Today the drums are still, and the bugles silent. Yet again our streets are full of men—grim, silent, shuffling men—tramping, searching men—seeking food, shelter, existence for themselves and their families.

Again America and those inner things we call "America" are tested. So give without stint this year:

To feed our hungry
To shelter our homeless
To protect our fatherless
To care for our sick
To cherish our aged
To guide our youth

Give! Because this is America!

COMMUNITY CHEST

CAMPAIGN FOR 1932

WESTERN PIPE AND STEEL NEWS

In This Issue:

Articles and Pictures on Natural Gas Pipe Lines of Southern Fuel Co. and Pacific Gas & Electric Co.

THE INSTALLATION OF THIS LINE MADE MORE NATURAL GAS AVAILABLE TO SAN FRANCISCO CONSUMERS.—*Pacific Gas & Electric Co. recently added 7½ miles of high-pressure automatic electric welded steel pipe to its San Francisco system. The pipe was fabricated at Western Pipe & Steel Co.'s South San Francisco plant.*

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P. G. & E. Co. Spends $5,000,000 During 1931 on Additions to Its Natural Gas System

By Willis S. Yard
Vice President in charge of Gas Construction and Operation
Pacific Gas and Electric Company

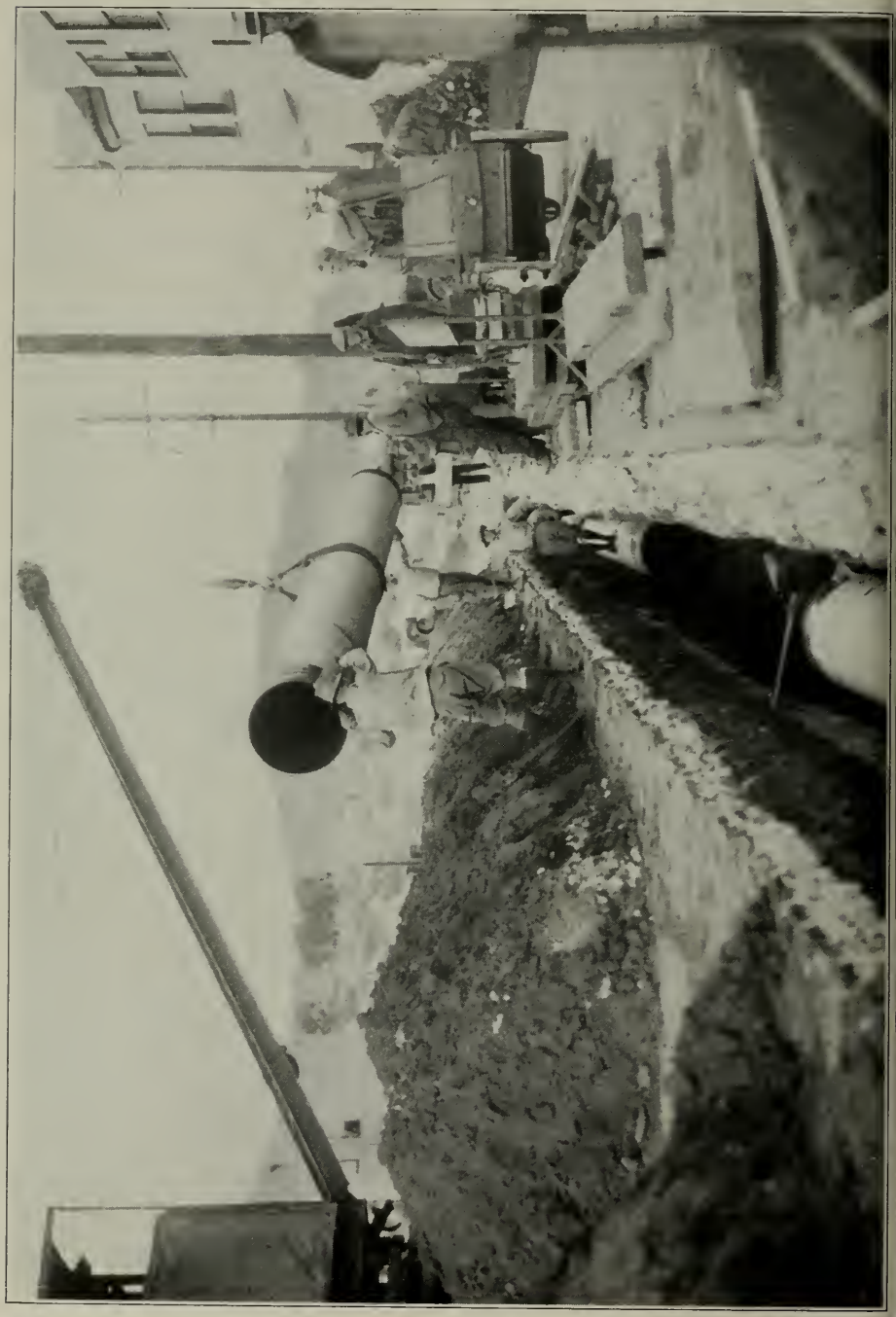
IMPORTANT additions to the natural gas system in Northern and Central California featured the gas construction program of the Pacific Gas and Electric Company during 1931—activities that required capital expenditures approximating $5,000,000, exclusive of large appropriations for routine operation and maintenance.

The additions were planned and carried out to supplement the company's achievements in 1929 and 1930, when more than 800 miles of transmission pipelines were constructed to serve natural gas from Kettleman Hills to communities in twenty counties. The work included laying new mains to supply several areas that had not had gas of any kind, replacing existing mains with larger ones to meet increasing demands for service and to take care of future growth, constructing new high-pressure distribution lines to accommodate the great number of industrial plants and commercial buildings that have switched to the new fuel, and installing improved facilities at points where present or future needs warranted.

Spread out over most of the territory served by the P. G. and E., these construction projects gave timely and substantial assistance to north-state workers and industries. On the various jobs, as in all its undertakings, the company followed its regular custom of employing local labor and making the fullest possible use of made-in-California equipment, materials and supplies. The Western Pipe and Steel Company of California, to cite just one example, manufactured the pipe for many of the new mains and thus was able to maintain much larger payrolls than otherwise would have been possible.

One of the outstanding jobs on the Pacific Gas & Electric Co. construction list is now nearing completion in San Francisco. It is the laying of seven and a half miles of 26-inch high-pressure main extending from the company's gas plant in the Potrero section to the San Mateo county line at the intersection of Alemany and Junipero Serra Boulevards. This line, costing $350,000, typifies the company's buy-at-home policy. The pipe, as large as that in use anywhere on the continent, was manufactured by the Western Pipe and Steel Company of California, and the construction equipment was also made locally.

The new main will be put into service as soon as possible to increase the supply of natural gas available for San Francisco's industrial establishments, commercial buildings and homes. In the near future it will become a unit of a second feeder pipeline that the Pacific Gas & Electric Co. will construct into the city from Milpitas, where the present feeder ties in with the line which runs



rom Kettleman Hills via Hollister nd San Jose. This new main will cost 2,000,000 and plans for the work ave progressed to the point of mapping the route and obtaining the ight-of-way.

Operations on the new San Francisco main illustrate how the company ooperates with the city in public improvements. Inasmuch as a great part of the line was routed along Alemany Boulevard, which the city has plans o pave, the company speeded up the project to avoid having to cut into new pavement. It even went so far as o detour the pipeline around sections of the thoroughfare already paved.

Another illustration of cooperation with municipalities was furnished in the Willow Glen section of San Jose. The company required additional distribution facilities there to serve residential areas and an industrial district in the vicinity of Moorpark Avenue. On learning of the city's plans to widen and pave Willow Street, the company rushed to completion the laying of more than a mile of six-inch high pressure main along Willow Street. The cost was $10,300.

An instance of main construction to accommodate industry was furnished at Spreckels, near Salinas, where the Spreckels Sugar Company operates a gigantic beet sugar factory. To supply this establishment the company laid more than five miles of 12-inch high pressure main from Salinas and about half a mile of smaller mains in and around the buildings. This construction, costing $82,500, also made natural gas available to the residents of the town of Spreckels.

Pacific Gas & Electric Co.'s new high-pressure line extends from the Potrero Gas Plant to the San Mateo County line, near the intersection of Alemany and Junipero Serra boulevards.

An important project was put through at Vallejo, one that not only improved distribution in that city but also insured the United States Navy Yard at Mare Island of an adequate fuel supply. The work consisted of constructing 1,880 feet of 12-inch transmission main within the Vallejo city limits, 16,820 feet of 12-inch main in the Vallejo suburban district, and 4,000 feet of eight-inch pipeline from Vallejo to the Mare Island meter station, where it ties in with the Navy Yard's distribution system. This work cost $63,750.

The city of Escalon, in San Joaquin County, was one of the communities added to the long list of those enjoying the advantages of natural gas. Service was introduced there by the construction of more than five miles of 4½-inch high pressure main, extending from Riverbank, and about four miles of distribution mains within the community itself. This job involved the engineering feat of laying the feeder line under the Stanislaus River near Riverbank. The budget item for providing service in Escalon was $52,310.

Woodbridge, San Joaquin County, also was hooked up with the natural gas network. This task was accomplished by laying a feeder line from Lodi and distribution lines to supply 110 consumers. In all more than four miles of mains were installed, ranging in size from 4½ inches to 2⅜ inches, and the expenditure was $22,-854.

The feat of laying two mains across the Sacramento River at Sacramento was successfully accomplished during the year. This work involved the feeder line from the capital to Woodland and was made necessary when the War Department undertook dredging operations to widen the river channel in the vicinity of Front and T Streets. This work necessitated moving the 6-inch feeder line running to Woodland and the company, always with an eye on the future, replaced the existing line with duplicate 8-inch lines that will take care of the Yolo territory's fuel needs for years to come. The cost of removing the old line and installing the new ones was $11,781.

Approximately $20,000 was spent to make natural gas available at the new Sunnyvale Airship Base. To have service ready when needed the company built about 10,000 feet of main into the site of the base. The line taps the Kettleman Hills - San Francisco feeder pipeline.

Construction of additional facilities at Kettleman Hills accounted for about $50,000. This job involved the construction of 9,300 feet of 16-inch main between the Standard Oil Company's 3-P and 33-J plants. This new gathering line added to the company's gas supply some 40,000,000 cubic feet available at the 33-J plant.

Gas line construction in Central California was not limited to the Pacific Gas and Electric Company. The San Joaquin Light and Power Corporation, which distributes natural gas in Fresno and adjacent territory, completed a new line from Fresno to Merced at a cost of $670,000. This line, about 60 miles in length, will supply the territory along the state highway between the two cities. It consists of six miles of 8-inch high pressure main starting at the Southern California Gas Company's plant at Fruit and Button Streets, Fresno, and extending along Fruit Street and Belmost Avenue to Grant Avenue; eight miles of 12-inch main from that point to Herndon, and then 47 miles of 8-inch main to Merced.

INSTALLATION OF 26-INCH DIAMETER AUTOMATIC ELECTRIC WELDED STEEL
ON PACIFIC GAS & ELECTRIC CO.'S NEW HIGH-PRESSURE LINE IN SAN FRANCIS
This new line consists of 35,000 feet of welded steel pipe 26-inch outside diameter of 5/16-inch
3,000 feet of the same diameter 9/32-inch plate. The pipe was fabr

stern Pipe & Steel Co.'s South San Francisco plant. The line extends from the Potrero Gas Plant intersection of Alemany and Junipero Serra boulevards at the San Mateo County line. It is con- d to the main transmission line from Kettleman Hills to San Francisco. Later on it will become a part Pacific Gas & Electric Co.'s second main line into San Francisco.

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WESTERN PIPE & STEEL CO. OF CALIFORNIA

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Edited by Richard Prossler

THE discovery and development of natural gas in the Kettleman Hills field some few years ago has brought about the construction of a tremendous mileage of natural gas pipe lines. In 1920, according to a report compiled by Claude C. Brown, Gas Administrator of the State Railroad Commission, there were only 980 miles of transmission lines in this state.

At the end of 1931 there are over 3,000 miles completed or under construction. During the same decade the number of natural gas consumers increased from 95,000 to 1,311,000, and the output of natural gas increased from 68,650 million cubic feet to 544,637 million cubic feet. The latter figure is for 1930.

It is interesting to note that out of the Kettleman Hills field 1,837 miles of transmission lines have been completed or are under construction. The following table gives the details of the lines from the Kettleman Hills field:

Line	Size (in.)	Miles
P. G. & E. Coast line	22-20	626.84
Stanpac Line	26-24-22-20	204.72
So. Cal. line, Fresno	10- 8	57.50
So. Cal. line, South	20	279.50
Southern Fuel Co.	26	210.00
San Joaquin L.&P. Corp.	12-8	119.00

Through the foresight and progressive policy of the management of Western Pipe & Steel Co. this organi-

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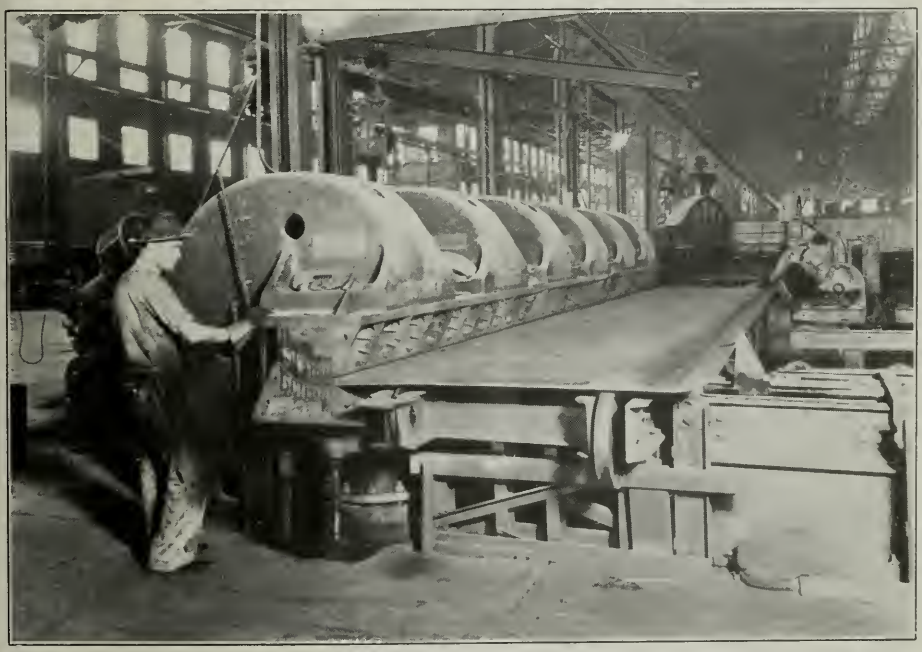
Method of shipping steel pipe for Southern Fuel Co.'s Kettleman Hills-Long Beach line. Pipe was made up in 60-foot sections, as shown above, with one idler car to carry overhang of two loaded cars.

Southern Fuel Co. Constructs 26-Inch Pipe Line from Kettleman Hills to Long Beach–207.7 Miles

By H. P. George
Chief Engineer
Southern Fuel Company

EARLY in the year 1931, the Southern Fuel Co. undertook to construct a 26-inch O.D. steel pipe line from Kettleman Hills to Long Beach; about 207.7 miles in length. This company is jointly controlled by Southern California Edison Co. and Pacific Lighting Co. The pipe line was designed to provide on adequate supply of gas for use by the Southern California Edison Co. in its steam plant at Long Beach, and for the various gas distributing companies controlled by Pacific Lighting in Los Angeles and vicinity, and to have a capacity of 130 million cubic feet daily.

The character of the territory traversed by the line varies widely. Starting at the north end in a rugged section of Kettleman Hills, the course of the line soon passes southerly into a long stretch of level country of Kettleman Plains and Antelope Plain, past the Lost Hills and Belridge oil fields to, and across, the west end of the Elk Hills; thence to the east of the Midway Sunset Oil field and across the southwest corner of the San Joaquin Valley to the foot of the mountain range between that valley and Southern California, at the mouth of Grapevine Creek. From this point, for a distance of 40.5 miles, the



Crimping edges of plate for Southern Fuel Co.'s pipe line, at Western Pipe & Steel Co.'s Los Angeles plant. Planer in background. There are six 200-ton crimping presses in line here. The plate is 30 feet long.

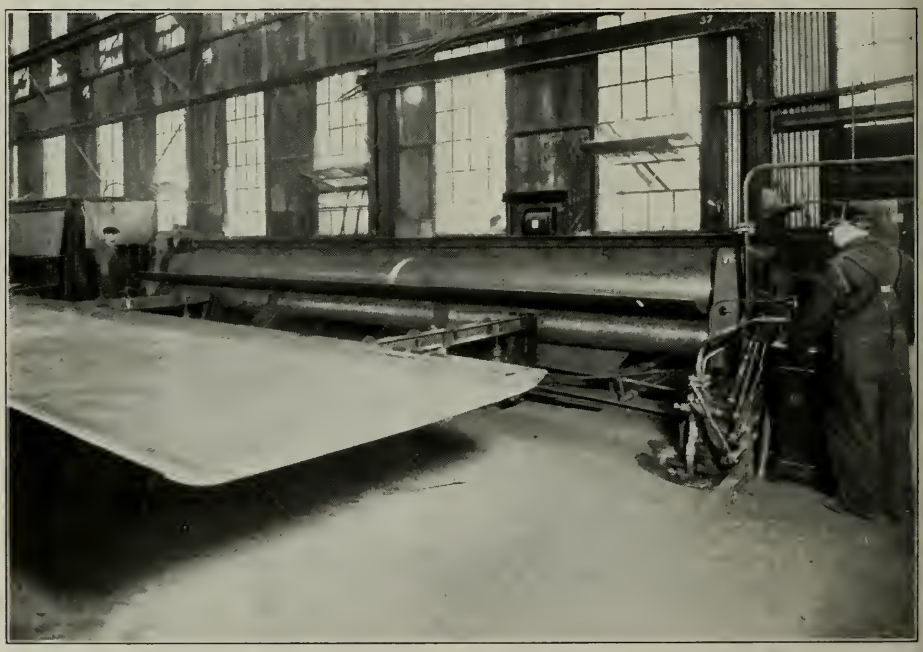
line follows the same course as the 22-inch line laid in 1930 by Southern California Gas Co. across rugged mountains between Grapevine and Castaic; thence along the electric transmission line of Southern California Edison Co. across the Castaic Valley, the upper end of the Santa Clara Valley to Newhall, and on to the Southern Pacific Railroad right-of-way near Sylmar; thence parallel to Southern Pacific railroad to Glendale.

From Glendale the route follows largely along congested streets of Glendale, the Boyle Heights district of Los Angeles City and County, continuing southerly parallel to Union Pacific railroad right-of-way through South Gate, Lynwood, Compton, and finally terminating at Long Beach, at the plant of the Southern California Edison Co.

Considerable saving in steel was effected by designing a line having graduated wall thickness, starting at 5/16-inch and changing to 9/32-inch and finally ¼-inch, as the pressure gradient declined. Provision was made in this plant for the addition of intermediate compressor stations as an increase in capacity of the line was required.

Automatic pressure limiting stations were designed and located at each point where the pipe wall thickness was reduced, in order to hold the pressure within safe limits on the thinner wall pipe. The system is designed for an initial pressure of 400 pounds in the field, and a minimum delivery pressure at the extreme southern terminus of the line of 50 pounds.

A soil survey of the entire route was made and a pipe protection schedule developed to take care of the varying soil conditions found. The



Steel plate for Southern Fuel Co.'s pipe line going through bending roll. This roll has capacity to handle a 30-foot plate ⅜-inch thick. Western Pipe & Steel Co. fabricated 76 miles of this pipe at its Los Angeles plant.

protection ranged from a minimum of two coats of cold paint to a maximum of two coats of hot applications with a wrapper in between.

The pipe was cleaned of all scale at the mill, either by pickling or shot blasting, and shipped to the job bare. Before any coating was applied the accumulation of rust or dirt was removed. In this manner it was possible to secure an unusually good bond between the pipe and the coating.

The crossings of Castaic Creek and Santa Clara River were made by placing the line well below the beds of the streams. Sufficient concrete anchorage was provided to overcome the buoyancy of the pipe. The crossing of Big Tujunga Wash was made on a carefully designed suspension bridge 720 feet in length.

The satisfactory completion of the line well ahead of schedule is evidence of the cooperation and the coordination of the various parties involved. The line was placed in operation November 17, 1931.

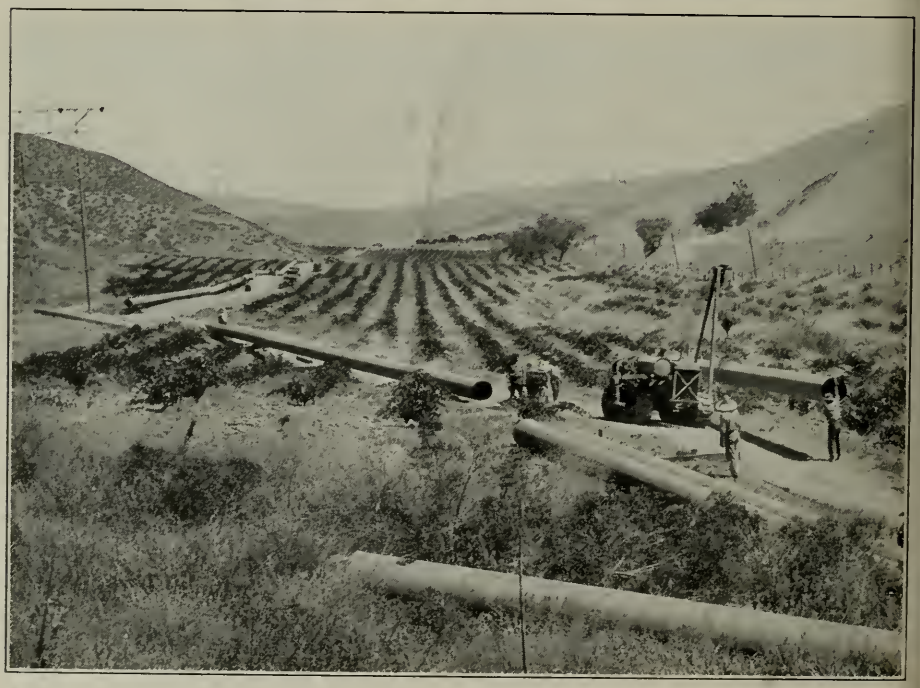
The foregoing text is published by special permission of Mr. George and the editor of "Western Gas."

(Continued from Page 8)

zation has been of material assistance in the development of natural gas and the extension of the network of pipe lines necessary to convey it to consumers.

Some time ago the company installed both at its Los Angeles plant and at South San Francisco, the latest improved equipment for manufacturing pipe of this type. At the same time the company's technical experts have developed improved shop methods, the benefit of which is passed on to our customers.

View along the line of Southern Fuel Co.'s natural gas pipe, near Castaic. Seventy-six miles of this pipe was fabricated at the Los Angeles plant of Western Pipe & Steel Co.



Upper view shows welder working on field joint, Southern Fuel Co.'s Kettleman Hills-Long Beach natural gas line. Lower, handling 60-foot sections of steel pipe along the trench.

VIEW OF FIELD OPERATIONS ON SOUTHERN FUEL CO.'S 208-MILE PIPE LINE TO CONVEY NATURAL GAS FROM KETTLEMAN HILLS TO LONG BEACH.—*More than a third of this order was fabricated at Western Pipe & Steel Co.'s Los Angeles plant. The pipe was shipped from the factory in 60-foot lengths as shown above. This picture was taken near Castaic.*

Unquestioned Responsibility in Shop and Field

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Designers, Fabricators and Erectors of

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